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# The Star Warriors

The weapon that may someday put an end to nuclear war sits in a vast bunker beneath the California desert, some 65 miles east of San Francisco. With a sound like a thunderclap, it sends 50-foot-long bolts of high-energy electrons down a yard-wide tunnel at nearly the speed of light. A Russian ICBM hit with the full force of the focused beam would crumple as if struck by lightning, which in effect it would be. As things stand now, of course, you'd have to get the ICBM into the tunnel first. This is the Star Wars defense as it might have been designed by God, but since God has a better angle on Soviet missiles coming over the North Pole, it's up to mortals to make it work.

Is it any wonder that scientists have fallen in love with nuclear defense? Here are fantastic, cataclysmic energies—megavolts and terrawatts and gigajoules, rending the air in microsecond bursts; here is a chance to build the kind of lasers they can only dream about in other fields. Here is a chance to help break the world's precarious dependence on the balance of terror, a chance for nuclear physics to do something for humanity in compensation for inventing the hydrogen bomb. Here is the greatest technological challenge in the world today, out of which may come the next generation of Nobel Prize winners and, in its very immensity, solve that most elusive of scientific quests, the search for lifetime funding. To almost everyone else, including Ronald Reagan, Star Wars is an abstraction—a promise of a distant millenium when nuclear weapons will no longer exist, a piece on the global chessboard, a budget line. To scientists, it is as real as lightning.

Their heroes are the engineers of the Manhattan (A-bomb) and Apollo (moon landing) projects; some of them, such as the atomic physicist Edward Teller, are the very same people. The head of the Strategic Defense Initiative himself, Air Force Lt. Gen. James Abrahamson, is a would-be astronaut and a former director of the space-shuttle program. But there are some who suspect that what Reagan has asked of them is the equivalent of Teddy Roosevelt pledging to put a man on the moon. "It's very different from a Manhattan project or an Apollo project," admits Donald M. Kerr, director of the Los Alamos National Laboratory. "You're talking about an area of applied science that's *much* less mature." That, of course, is part of the lure of Star Wars—the chance to be in a field where, as the 28-year-old physicist Lawrence West puts it, "the number of new weapons designs is limited only by one's creativity." The chief scientist for SDI, Gerald Yonas, is interested in the Jedi Concept, for example—an idea for firing globs of plasma (a cloud of highly energized atomic nuclei and electrons) at nearly the speed of light. Unfortunately, no one knows how to make plasma stick together in space, but Yonas says that there must be a way to do it because nature demonstrates the phenomenon in Saint Elmo's fire and in the giant streams of interstellar plasma. A weapon still in search of a theory of how it should work is not likely to be of much use any time in this century. But as a problem for scientists to work on over the next 20 years, it beats trying to figure out how to make an H-bomb the size of a cantaloupe.

**The Defenders' Problem:** The problem with mounting a nuclear defense is that the offense has a 40-year head start, which may well prove insurmountable. A Soviet attack on the United States could begin with the launching of more than 2,000 land-based ICBM's simultaneously. Any defense would have to go to work literally within seconds, to destroy as many missiles as possible in the "boost phase"—while their rocket engines are firing—which lasts only about five minutes. Following the boost phase, each missile releases as many as 10 separate warheads, each on a different trajectory, so the defense now must face as many as 20,000 targets. To complicate the defenders' problem, the missiles may also carry hundreds of thousands of decoy warheads that would have to be tracked. This "midcourse" phase lasts 20 minutes or so, after which the warheads re-enter the atmosphere on their way toward their targets. At this point, the lighter decoy warheads will be stripped away, making the defense's job easier again—but by then the warheads are only one minute away from impact, and a nuclear bomb going off even at a considerable altitude can wreak havoc on what weapons designers refer to as "soft targets"—meaning people. For most of their course, the missiles would be over the horizon from ground stations in the United States, so the defensive weaponry would have to be situated on hundreds of satellites. There, even if such trenchant problems as space lift and computing and power supply could be solved, they would be open to a pre-emptive strike by Soviet anti-satellite weapons.

**'We're talking about tearing up the basic strategy [of deterrence] we've had for 20 years.'**

*Lockheed strategic analyst Maxwell Hunter*

To this challenge the 52-year-old Abrahamson, who describes himself as "a professional R&D officer" (although he also flew F-100s in Vietnam), brings some unique strengths: a technological bent (he helped develop the NATO version of the F-16), experience in running large organizations and a willingness to try unconventional military tactics, such as frankness. Most of what is publicly known about Star Wars is the result of a decision taken late last year to lift the traditional Pentagon shroud of secrecy over weapons research. Compared to projects such as the radar-evading Stealth bomber, whose very existence was once meant to be secret, the Star Wars office has been a fount of information intended to convince Congress that the notion might actually work—a tactic that proved its worth last week when the Senate voted down, 57 to 38, a proposal to trim more than $1 billion from SDI's $3 billion appropriation for fiscal 1986. Abrahamson's task is doubly difficult because he is not merely confronting the familiar enemy of congressional liberalism; he also is in a rear-guard battle against the Pentagon establishment, which holds to the traditional military view that playing defense is a lower calling. "We're talking about tearing up the basic strategy [of deterrence] we've had for 20 years or so," says one

**'I did the analyses in the space of an hour after a couple of cans of beer.'**

*Physicist Gregory H. Canavan of Los Alamos*

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sympathetic observer, Maxwell W. Hunter II, a strategic specialist with Lockheed Corp. "People's careers are tied to that line of thinking. No wonder everybody is upset." Republican Sen. Malcolm Wallop, an early supporter of missile defense, actually suspects that Star Wars was "set up to fail"—that its emphasis on exotic weapons no one knows how to build is intended primarily to ensure that it remains a research program forever. Abrahamson considers "forever" an overstatement, although he admits that "we're on a time scale that exceeds nearly all of us who are going to be in the program."

Such a quest, of course, is alien to the military mind, which is oriented toward getting the kind of results that can show up on maps tomorrow. This may be why Abrahamson has hired people like Yonas, who came to weapons work from the 20th-century equivalent of the search for the philosophers' stone, fusion-power research. The general's favorite illustration of a Star Wars scientist is the sensitive, introspective James Ionson, a 34-year-old specialist in magnetohydrodynamics, who wanted to work on missile defense for the sake of his children. He is now the head of SDI's innovative-concepts program. "A lot of us in the scientific community," Ionson says, "feel like we were responsible for this monster [of nuclear weapons] in the first place. Ten or 15 years ago, if you worked for the Department of Defense, you were a pariah in some parts of the scientific community because the notion was that you had to be working on offensive weapons. And if that were still the case, I wouldn't be here. The beauty of what we are working on is that none of these ideas can be scaled up to levels that would create mass death."

**The Ultimate Task:** Ionson stands at one pole of philosophic thought on the subject of missile defense, of which the other is represented by Lowell Wood, 43, the burly and sometimes intimidating head of O Group, the creative nucleus of Lawrence Livermore National Laboratory in California. Livermore is one of the three great weapons labs—the others are Los Alamos and Sandia, both in New Mexico—which among them have designed every nuclear weapon the United States possesses. Wood—a bona fide genius, who earned his doctorate in astrophysics at the age of 23—sometimes gives the impression that he does weapons research because he likes to see things get blown up. He speaks with the casual jocularity of the weapons world, in which missiles are "flying kerosene cans" and their looping trajectories are "golden arches." "To kill flying kerosene cans that bring hydrogen bombs is not much more difficult, at the end of the twentieth century, than dynamiting fish," he says. Talking about the possibility that the Russians could defeat a laser weapon by making their missiles spin (so that the beam couldn't dwell on one spot long enough to burn through), he compares the problem to using "a submachine gun against a ballet dancer." He is also a disciple of the Teller school of public relations, which holds that an argument about national security is usually won by the side that withholds the greatest number of facts. Even as Abrahamson is trying to show people how much progress has been made, Wood is given to hinting darkly that "the things most discussed in public are the ones the government is least interested in."

No less than Ionson, weapons specialists like Wood believe their ultimate task is to safeguard human civilization, but they also have an interim goal, which is to put something up there that will *drive the Russians crazy.* "The more complex the problem, the better I like it," says Wood's O Group colleague Roderick Hyde cheerfully, "because there's a greater imbalance between our ability to do it and the Soviets'." One of the biggest problems in designing a missile defense, for example, is differentiating incoming warheads from the decoys that presumably would accompany them. If it cannot be solved directly, the military approach is to turn it into an opportunity to make the Soviets sweat. Donald Russ of the Army's missile-defense center in Huntsville, Ala., says the system would probably use a combination of sensors, because the enemy "has to put a different set of observables [decoys] in there for each kind of sensor. He's got to take part of his payload weight off to put penetration aids on. No offensive designer really wants to take the bomb off to put something else on."

**The Secret Panel:** It is in the weapons labs that the military mind and the scientific one come together, to produce a distinctive style and philosophy. It may have something to do with going to work in places where the gift shops sell postcards with views of the Nevada nuclear-test site. It is a style patterned on the beguiling arrogance of a fighter jock; the most common expression an outsider encounters is the thin smile with which a researcher responds "I can't answer that" to a seemingly innocuous question—even though, as Tom Starke of Los Alamos admits, "There are some things I can't say that you can read in Scientific American." The atmosphere is of a grad school writ large—cubicle walls covered with posters, 10-speed bikes in the corners—but with better benefits, such as Los Alamos's private ski area. Not surprisingly, several of the scientists who have come from the labs to work for Abrahamson have arranged to be "loaned" to the government, keeping their laboratory tenure—and paychecks that average as much as 20 percent higher than in universities.

They are warriors of a sort, too, fighting on behalf of strategic weaponry in scientific journals, on op-ed pages, and—if they are very good—in appearances before the JASON's, a panel of top academic scientists that advises the Pentagon on secret research. Los Alamos physicist Gregory H. Canavan, who was once the youngest lieutenant colonel in the Air Force, became one of the first scientific heroes of Star Wars when he disputed a negative report by the Congressional Office of Technology Assessment. It took him four pages of calculations to show that the number of laser battle stations a missile defense would need is proportional not to the number of missiles launched but to the square root of the number of missiles—in other words, that the critics had greatly overestimated the size and cost of the program. "I did the analyses in the space of an hour after a couple of cans of beer," he says, with the kind of laconic self-deprecation that carries the implication that the opposition wasn't all that hot.

**'Small nuclear explosives may offer such an advantage they have to be part of the system.'**

*Particle-beam expert Pace VanDevender*

They are competitive, of course: the jockeying has already begun among the proponents of the various beams and particles under consideration. To be sure, there is nothing like the feverish greed with which defense contractors lobby for a fighter contract. No one knows which companies will eventually build these weapons, let alone how much an ashtray or a coffeepot for them will cost. But scientists can be just as passionate about ideas as lobbyists can be about money. At Livermore, it is often said, there are three levels of classification: secret, top secret and don't tell Los Alamos. It is that rivalry which has helped keep alive, for example, electron-beam weapons. Many physicists doubt that they will ever turn into

**'The things most discussed in public are the ones the government is least interested in.'**

*Lowell Wood (rear, with beard) and team*

a useful space weapon, even apart from the problem that the prototype (the Advanced Test Accelerator, described above) is several hundred feet long, buried in concrete and hard wired into its own 20-megawatt electrical substation. One theory is that a space-based electron gun would eventually shoot itself in the back, since in throwing off electrons it would acquire a net positive charge; after enough shots, the charge would be so strong that it would attract the negatively charged beam back onto itself. The Livermore team says its calculations show that won't be a problem. A more persuasive objection was raised by physicists who pointed out that a beam of electrons in space will be bent unpredictably by the Earth's

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# Realistic Defense Or Leap of Faith?

At 6:18 a.m. a year ago June 11, radar operators at a U.S. military station on the Kwajalein atoll in the South Pacific identified a target rising above the horizon: an American intercontinental ballistic missile fired from Vandenberg Air Force Base in southern California, more than 4,800 miles away. Army officers immediately unleashed a killer rocket of their own, an old Minuteman missile equipped with a sophisticated heat-seeking sensor system. The interceptor streaked up over the Pacific, its sensors scanning the cold background of outer space. Within 10 minutes it found the missile and closed in. At an altitude of more than 100 miles, the retooled Minuteman deployed a 15-foot-diameter metal net designed to snare the target. Moments later the killer rocket smashed into the invader, destroying it and its dummy warhead. "It hit right square on the nose," says Lt. Gen. James Abrahamson, director of the Pentagon's Strategic Defense Initiative Organization (SDIO). Following three failures, the test was one small step for Star Wars—leading to one giant leap of faith that the program may someday lead to the promised results.

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fluctuating magnetic field, making the weapon impossible to aim. So Livermore scientists have proposed aiming the electron beam by firing a laser at the target first. The laser, which is unaffected by magnetism, would create a "channel" of ionized air for the electron beam to follow. This is an ingenious solution to what was both a scientific problem and a bureaucratic one. As Louis Marquet, SDI's director of beam weapons put it, "The folks at Lawrence Livermore, who have a vested interest in making charged-particle beams, were unwilling to accept the verdict that they are not players."

There is more than prestige at stake here; the question goes to the heart of one of the most critical issues in strategic defense, whether nuclear weapons themselves should be used against enemy missiles. Although they have branched out into exotic beam weapons, Livermore and Los Alamos remain nuclear laboratories at heart and they are unlikely to surrender their primacy in strategic weaponry without a fight. The administration's policy, as one defense-industry expert delicately puts it, is that nuclear weapons are "a fallback position"—to which Canavan responds: "That's what they'd *like* to believe."

"It's very difficult to do nonnuclear defensive weapons," says Pace VanDevender of Sandia; "it may be that small nuclear explosives offer such an overwhelming advantage that they will have to be part of the system." For his part, Teller appears to regard any prejudice against nuclear weapons as sentimental claptrap. He has taken the lead in promoting a device called the X-ray laser, which consists of a nuclear bomb surrounded by metal rods. When the bomb explodes, each of the rods emits a powerful blast of X-rays that can burn a hole in a missile. One immediate problem is that nuclear weapons are banned in space by a 1967 agreement. So Teller has proposed a "pop-up" version of the weapon, which would be launched only after an attack had started, climb to an altitude of 650 miles while the attacking missiles are still in their boost phase and then fire. In response, the Soviets might build "fast-burn" boosters that would fire for only around 50 seconds, rather than five minutes. Asked whether that wouldn't make it impossible for the X-ray weapons to pop up in time, Teller responds, "I don't know." But he thinks they're worth developing anyway because it may be cheaper for us to build them than for the Soviets to redesign their entire ICBM fleet. This argument, while it has strategic merit, is a long way from Reagan's proposal for a defensive system that would render nuclear weapons "impotent and obsolete."

**A Foolproof System:** To the main question—will it all work?—there is no easy answer. If you concentrate just on the narrow technical issues, progress is clearly being made. Simply finding a way to knock down a missile (lethality, as weapons designers call it) is in some ways the easiest problem. Many scientists believe the United States could have at least a partial missile defense before the end of the century if it ignored particle beams and lasers and concentrated on ordinary projectiles, for which the theoretical work has already been done, mostly by Galileo. The trick is to achieve the velocity necessary to knock out a missile traveling at more than 10,000 miles an hour. The answer may be the rail gun, which accelerates bullets electromagnetically, rather than by the force of a chemical explosion. Yonas keeps on his desk a box with an inch-thick aluminum plate that was pierced clear through by a 10-gram plastic pellet fired at two kilometers per second. He wants it to achieve a velocity five times as great—and increase the payload weight to two kilograms, so that the projectile can be packed with the homing and guidance equipment to steer it for a head-on collision with a missile 3,000 miles away.

Even the task of distinguishing between real warheads and decoys may be solved eventually. At Sandia, Bruce Miller is working on what he believes is a foolproof system, based on aiming a neutral particle beam at the "threat cloud" of incoming warheads and decoys. Any object hit by the beam would emit gamma rays in proportion to its mass; the warheads, being heavier than the decoys, would give off more radiation and thus draw attention. And already physicists are gearing up to tackle the scores of obscure difficulties one level below the surface of this immense undertaking, such as inventing an electrical switch that can close a circuit carrying billions of watts and open it again in less than a microsecond. A team at the Polytechnic Institute of New York has a three-year grant to study that question.

But counting up challenges met and overcome is the wrong way to look at Star Wars; it has to be evaluated as a system to which the United States might someday entrust its survival. "The long pole of the tent is not the weapons," says Abrahamson; "it is the infrastructure [and] the command-and-control system." (Or, as Stanford high-energy physicist Sidney Drell, an SDI critic, puts it, "This isn't a technologic pissing match.") The real questions are not just whether a weapon can be built to shoot down missiles, but whether the system as a whole will work reliably, whether it will be vulnerable to a pre-emptive attack and whether it can be put into place for a reasonable sum—$1 trillion, say. Everything from the computer chips to a new national strategic doctrine must be invented from scratch. Not the least of Abrahamson's problems is that for Star Wars to be remotely affordable, the cost of orbiting payloads will have to come down from the $3,000 a pound it costs on the space shuttle to around $300.

It is that kind of calculation that fuels the debate between those who see Star Wars as the most inspiring scientific challenge of our age and those who regard it as a doomed effort to outspend the laws of nature. There is no problem so difficult that a solution cannot be imagined—as long as imagination is all it takes. We can put giant lasers on the ground and bounce the beams off orbiting mirrors. We can invent a special coating for the mirrors so they can change their focus electronically, instantaneously, without having to change their position. We are like crusaders seeking to defend a castle against an attack of Saracens. If we can hoist enough three-ton boulders up to the ramparts and drop them fast enough, our problem is solved. We are at the stage of having just found a boulder.

JERRY ADLER with GERALD C. LUBENOW and MICHAEL ROGERS in San Francisco, KIM WILLENSON in Washington and bureau reports

# policy REVIEW

Summer 1985 Number 33 Four Dollars

## The Defense Budget: A Conservative Debate

# A Star Is Born

## Strategic Defense Has Unconditional Support

### A *Policy Review*/Sindlinger Poll

After two decades of political disharmony, Americans are reaching a new consensus on some of the most important defense issues facing the United States since the birth of the bomb. Americans overwhelmingly support President Reagan's proposed Strategic Defense Initiative (SDI), also known as "Star Wars." Eighty-five percent favor developing a missile defense "even if it cannot protect everyone," and 69 percent even if it means "withdrawing from our existing arms control agreements" with the Soviets. Nearly three-quarters of Americans believe that a Star Wars system would "make the U.S. more secure."

As a solution to the current Soviet advantage in land-based missiles, more Americans favor developing the President's Strategic Defense system to a U.S. missile buildup or to a U.S./Soviet nuclear freeze.

These are the results of the *Policy Review*/Sindlinger Poll conducted between May 7 and May 27. Sindlinger & Company, Inc. of Media/ Wallingford, PA surveyed 2,318 Americans in proportion to the population of the 48 contiguous states. Ninety-five percent of the original sample was interviewed.

The opinion poll also revealed that a very large number of Americans are not aware of a number of critical strategic advantages enjoyed by the Soviets. For example, 43 percent do not realize that the United States cannot protect itself from a Soviet nuclear attack, and two-thirds do not realize that Moscow is ahead of the United States in developing a Star Wars system.

The poll found that Americans strongly disapprove of current U.S. nuclear strategy, which relies on the threat of massive retaliation to deter a Soviet nuclear attack, while leaving the U.S. defenseless against a Soviet nuclear attack. Sixty-one percent believe that the current U.S. nuclear strategy is "dangerous and does not sufficiently defend" the United States and 74 percent believe it "needs to be changed." If a missile defense can be made to work, 77 percent favor developing and deploying it over continued reliance on our current nuclear strategy.

In findings significant for the U.S.-Soviet arms talks and the status of the 1979 SALT II treaty, 90 percent favor continued arms talks with Moscow. Yet 68 percent of Americans believe that the Soviet Union "cannot be trusted" most of the time. In the event of Soviet cheating on arms control treaties, 92 percent believe the Reagan Administration should publicize the Soviet violations and 62 percent would favor an increase in U.S. defense preparations. Some 85 percent of Americans would not consider it a foreign policy failure were no agreement reached at the Geneva talks. As for SALT II, which expires at the end of this year, 51 percent oppose U.S. compliance beyond that date; only 43 percent favor U.S. compliance.

Americans appear to support the arms control process, as long as it does not weaken U.S. security. For example, 69 percent believe the United States should build the President's Strategic Defense system even if it involved "withdrawing from our existing arms control agreements" with the Soviet Union.

The poll found that American females are consistently more hawkish than their male counterparts. For example, when the Soviet Union violates its arms control treaties, only eight percent of American men would favor discontinuing further arms control talks, compared to 26 percent of American women. Similarly, while 96 percent of American men agree that the United States should engage in arms control talks with the Soviets, only 85 percent of American women do.

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Part I. Arms Control

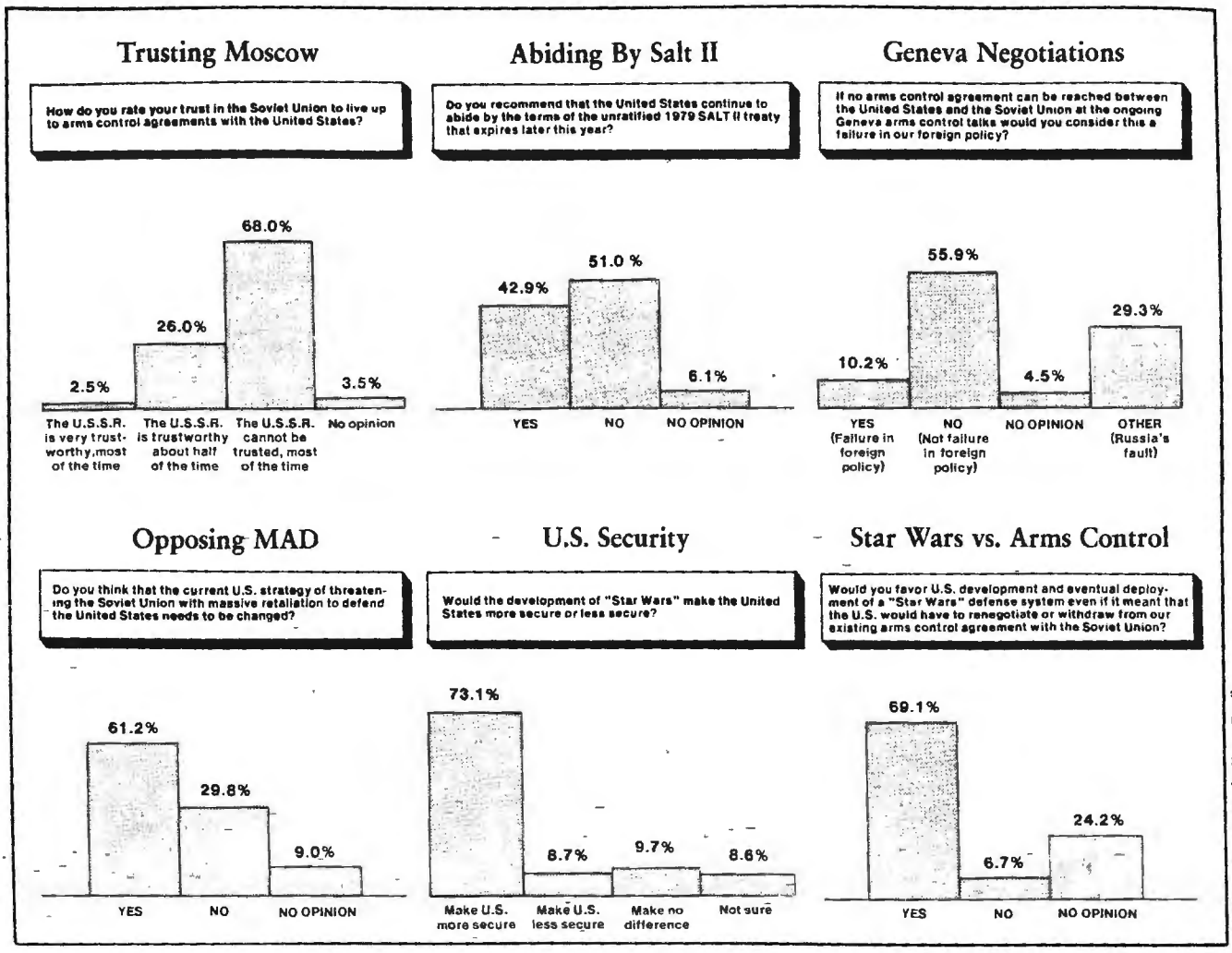
1) How do you rate your trust in the Soviet Union to live up to arms control agreements with the United States?

| | |
|---|---|
| The Soviet Union is very trustworthy most of the time | 2.5 |
| The Soviet Union is trustworthy about half of the time | 26.0 |
| The Soviet Union cannot be trusted most of the time | 68.0 |
| No opinion | 3.5 |

2) Do you agree that the United States should currently be engaged in arms control talks with the Soviet Union?

| | |
|---|---|
| Agree | 90.1 |
| Disagree | 7.1 |
| No opinion | 2.8 |

3) In the future, if the Soviet Union violates arms control treaties it has signed with the United States, do you believe we should . . .




Graphs for *Policy Review* by Karen Portik.

A. immediately withdraw from the treaty?
Yes ..... 37.5
No ..... 54.0
No opinion ..... 8.4

B. increase our defense preparation?
Yes ..... 61.5
No ..... 29.2
No opinion ..... 9.3

C. publicize the Soviet violations?
Yes ..... 92.3
No ..... 4.1
No opinion ..... 3.6

D. discontinue further arms control talks with the Soviets?
Yes ..... 17.6
No ..... 79.6
No opinion ..... 2.9

E. continue to abide by the treaty?
Yes ..... 64.1
No ..... 30.5
No opinion ..... 5.4

4) Although the United States never ratified the 1979 Salt II arms control agreement with the Soviet Union, our nation has abided by the terms of the treaty for the past five years. This treaty expires later this year, and it is known that the Soviet Union has violated the treaty in five key areas. Do you recommend that the United States should continue to abide by the terms of the treaty?
Yes ..... 42.9
No ..... 51.0
No opinion ..... 6.1

5) If no arms control agreement can be reached between the United States and the Soviet Union at the ongoing Geneva arms control talks, would you consider this a failure in our foreign policy?
Yes ..... 10.2
No ..... 55.9
No opinion ..... 4.5
Other (Soviets Union's fault) ..... 29.3

Part II: "Star Wars"

1) Can the United States protect itself now from incoming nuclear missiles?
Yes ..... 8.9
No ..... 57.1
Not sure ..... 17.6
Hope so ..... 16.4

2) Current U.S. policy is to deter a Soviet nuclear attack by threatening massive retaliation against the Soviet Union, while at the same time leaving the United States defenseless against a Soviet nuclear attack. This strategy is often referred to as MAD (which stands for Mutual Assured Destruction), or as the "balance of terror." Which one of the following statements do you feel most comfortable with?

A. The current strategy does not need to be changed.

| | |
|---|---|
| No need to change | 11.7 |
| Needs to be changed | 74.4 |
| No opinion | 13.9 |

B. The current strategy is dangerous and does not sufficiently defend the United States.

| | |
|---|---|
| Yes | 61.2 |
| No | 29.8 |
| No opinion | 9.0 |

3) If "Star Wars" can be made to work, and there is a choice between the current mutual assured destruction ("balance of terror") strategy or the new plan of "Star Wars," which would be your number one choice?

A. Keep the current strategy?

| | |
|---|---|
| Yes | 10.2 |
| No | 80.0 |
| No opinion | 9.8 |

B. Or develop and deploy "Star Wars?"

| | |
|---|---|
| Yes | 77.0 |
| No | 10.0 |
| No opinion | 13.0 |

4) Under what conditions would you support the President's Strategic Defense proposal?

A. If it could destroy almost all incoming missiles?

| | |
|---|---|
| Yes | 84.4 |
| No | 10.7 |
| Not sure | 4.9 |

B. If it could destroy at least half of incoming missiles?

| | |
|---|---|
| Yes | 71.9 |
| No | 19.4 |
| Not sure | 8.7 |

C. If it defends only U.S. retaliatory missiles?

| | |
|---|---|
| Yes | 61.5 |
| No | 26.8 |
| Not sure | 11.7 |

5) Would the development of "Star Wars" (the President's Strategic Defense strategy) make the United States more secure or less secure?

| | |
|---|---|
| More secure | 73.1 |
| Less secure | 8.7 |
| No difference | 9.7 |
| Not sure | 8.6 |

6) Currently the civilian population of the United States has no complete defense against any enemy nuclear attack. Even if a perfect defense cannot be developed, would you favor and support developing a system which protects most of our population, even if it cannot protect everyone?

| | |
|---|---|
| Yes | 84.7 |
| No | 2.4 |
| Not sure | 12.9 |

7) According to the best information available, the Soviet Union now has 1,398 land-based missiles which could reach the United States. On the other hand, we have 1,030 land-based missiles which could reach the Soviet Union. Which of these conditions would make you more secure?

A. The U.S. and the U.S.S.R. agreed to freeze their nuclear arsenals at present levels?

| | |
|---|---|
| Yes | 47.5 |
| No | 49.7 |
| No opinion | 2.7 |

B. The U.S. built the President's strategic defense system?

| | |
|---|---|
| Yes | 64.8 |
| No | 16.3 |
| No opinion | 18.9 |

C. The U.S. built more missiles to equal the Soviet Union?

| | |
|---|---|
| Yes | 36.4 |
| No | 24.5 |
| No opinion | 39.1 |

8) Some people say that in the development of any strategic defense system that could destroy incoming missiles, the Soviet Union is far ahead of the United States, while other people are saying that the United States is far ahead of the Soviet Union. What do you think?

| | |
|---|---|
| Soviet Union ahead | 33.6 |
| Soviet Union behind | 26.3 |
| Both the same | 17.0 |
| Not sure | 23.1 |

9) Would you favor development and an eventual deployment of a "Star Wars" defense system for the United States, even if it meant that the U.S. would have to renegotiate or withdraw from our existing arms control agreements with the Soviet Union?

| | |
|---|---|
| Yes | 69.1 |
| No | 6.7 |
| No opinion | 24.2 |

FRIDAY, JANUARY 3, 1986 WASHINGTON, D.C. The Washington Times

# Scientist assesses SDI as a '90s reality

By Roger Fontaine
THE WASHINGTON TIMES

Major technical advances within the last two years should enable the United States to deploy the first phase of the Strategic Defense Initiative by the early or mid-1990s, President Reagan's outgoing science adviser says.

"There have been monumental breakthroughs that have made us far more confident 2½ years later than we projected even in the optimistic tone that was evident in the original [SDI] speech," said George A. Keyworth II in an interview before he left his post this week.

Mr. Reagan delivered the original SDI speech March 19, 1983.

The technical breakthroughs have been largely made in the most promising area of anti-ballistic missile research, Mr. Keyworth said.

Such breakthroughs would enable the United States to destroy ICBMs during the so-called "boost phase," shortly after launch, long before they leave the atmosphere.

Destroying an ICBM at that point is the most effective ABM defense possible because it destroys the whole missile "package," including warheads and decoys, he said.

"It means instead of placing ... a shield over America, it ... represents a lid over the Soviet Union," he said.

Such a defense would give "total credence to that often-ridiculed concept of making ballistic missiles ... obsolete," by making them "thoroughly unreliable delivery systems."

The boost-phase defense principle could apply to both land and submarine-based missiles, and would be done through the use of ground-based lasers which would direct "a high quality optical beam" at space-based so-called "deformable mirrors" which in turn would direct the beam back to earth destroying the targeted missiles, Mr. Keyworth continued.

The reflectors in space, also known as "rubber mirrors," would be cheap enough to deploy in large numbers in order to ensure survivability of the system, he said.

Making the defense cheaper relative to offensive weapons was a principal requirement of the administration's SDI program from the beginning, Mr. Keyworth said.

The cost-effective defense is also the key to successfully stemming the nuclear arms race, the scientist contended.

The Soviets, he said, are well aware of the American technological advances, and have a large program of their own, which he predicted would soon have its capabilities revealed.

The Soviets also are aware that the United States will be able to dem-

•(continued)

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onstrate the technical feasibility of a laser-based ABM system "if not in Ronald Reagan's tenure, which is still possible, then very shortly thereafter," Mr. Keyworth said.

Deployment for the boost phase anti-missile defense in the early or mid-1990s cuts years from earlier estimates, he declared.

"Whoever is president in the early 1990s will have ... sufficient information to think seriously about deployment," he said.

Even with all the different interpretations of the 1972 ABM treaty, it is clear that it would allow either side to prove the technical feasibility of a boost-phase system, but it would put constraints on its actual development, he said.

At that stage, Mr. Keyworth said, it will be important to ask which is more important: "to protect people and nations or defend treaties?"

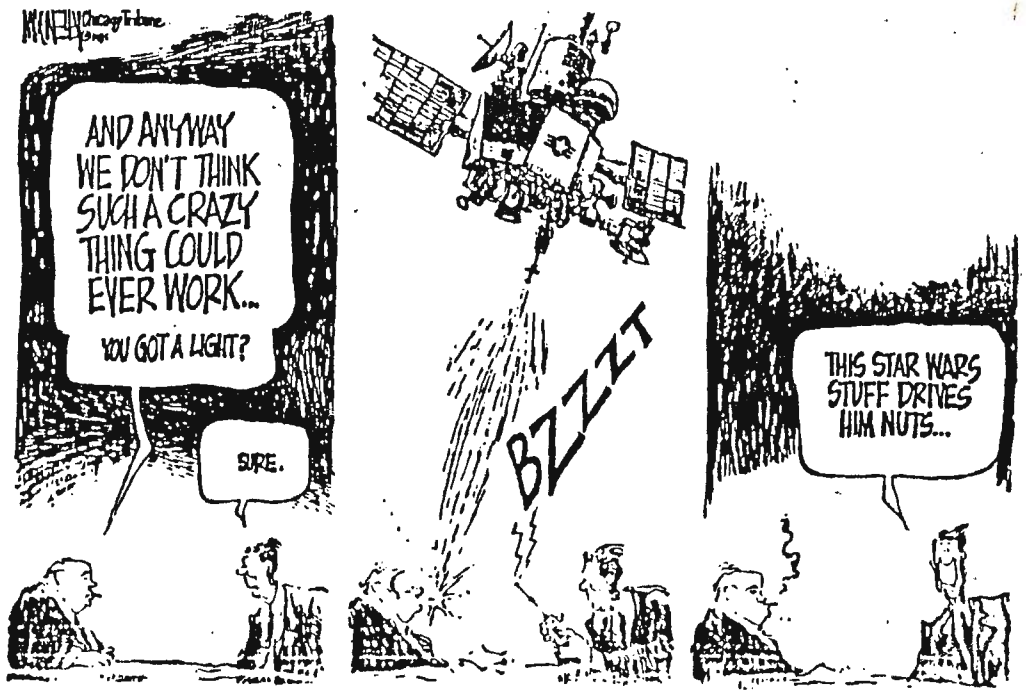
He denied Mr. Reagan's idea sharing technology with the Soviets was "ludicrous" or "an act of charity."

Citing the Geneva Summit as achieving a small first step in sharing through the proposed use of "open laboratories," Mr. Keyworth said the president's proposal was "as a willingness on our part to take whatever steps are necessary to ensure that the Soviet Union not perceive us achieving a first-strike capability ..."

The process could include, he said, the sale of some technology or the sharing of a control mechanism.

Mr. Reagan's proposal has been taken seriously in Western Europe, he said.

As for SDI itself, "the trends in Europe are clearly more supportive," because of Mr. Reagan's performance in Geneva, an increasing awareness of the technical feasibility of the concept and a desire to share in the technical advances that will be spurred by SDI research.



The Washington Times TUESDAY, DECEMBER 3, 1985

ROBERT JASTROW/ FREDERICK SEITZ

# Progress on the SDI front

The most striking aspect of the Reagan administration's Strategic Defense Initiative is the rapid progress that has been made toward achieving its technical goals in the first year-and-a-half of its existence.

When the president gave his speech on strategic defense in March 1983, he based his call for research on the fact that the newly emerging technologies of ballistic missile defense appeared to have great promise. The report by the Defense Technologies Study Team, the so-called Fletcher Commission, confirmed this, but warned against expectations of early success, predicting demonstration of key technologies perhaps in the early 1990s and possible deployment in the early years of the 21st century.

This timetable appears to have been too conservative. Unexpectedly rapid progress in the SDI program, almost across the board, has led its director, Lt. Gen. James Abrahamson, to announce in recent congressional testimony that it may be possible to cut more than a decade from the time-lines laid out by the Fletcher team.

Among the major accomplishments of the past year are the following:

• The Free Electron Laser.

This dark horse among laser technologies has come to the fore in the last year as a result of exceptional progress at Lawrence Livermore Lab and at Los Alamos. Livermore scientists have tested a free electron laser at a peak power of 1 billion watts, with peak powers of a trillion watts in prospect in a few years, as well as repetition rates of thousands of pulses a second. Prospects appear to be excellent for achieving average power levels far greater than the 20 million watts deemed necessary for an effective laser defense against Soviet missiles. The MIRACL laser at White Sands has been tested at a power level of several million watts, and work is now in progress on mating the MIRACL laser to other components needed for a full anti-missile weapons system.

• The Rubber Mirror.

When the president gave his speech, laser technologies already offered promise of a defense against enemy missiles; it was not clear, however, whether it was best to keep the laser on the ground or to put it into a satellite orbiting over the Soviet Union. Putting the laser into a satellite seems like the most direct method but has the disadvantage that the heavy weight of the laser, plus its fuel and power supplies, have to be lifted into orbit. Keeping the laser on the ground solves that problem but has the drawback that the atmosphere tends to spread out a laser beam, so that it cannot be focused to a sufficiently sharp and intense spot to destroy a missile.

In September, a critical test was run with a device called a "rubber mirror," which changes its shape many times a second in such a way as to correct for the spreading effect of the Earth's atmosphere. The test seems to settle the question in favor of keeping the lasers on the ground. It was a milestone in SDI progress because it opened the way to the use of ground-based lasers in missile defense. As Gen. Abrahamson indicated, that means laser defenses may become a reality 10 years earlier than anticipated.

• The Railgun.

Rapid progress has also been achieved in the past year on the electromagnetic railgun — a device for propelling a "smart bullet" on collision course toward an enemy warhead at extremely high speeds. The high speed produced by the railgun means that the gap between the intercepting "smart bullet" and the warhead will be closed very rapidly. This increases the effectiveness of the defense and makes it more leak-proof.

One line of progress in this technology involves the ability to fire many bullets from the railgun in rapid succession. A recent test succeeded in firing the bullets at the rate of five every half second, whereas a year ago, the best that could be done was one shot every two or three days. As a result of this success, it now appears that no obstacles stand in the way of achieving the necessary rate of fire in the fairly near future.

• The SCRAMJET.

The concept of a new kind of rocket engine called the SCRAMJET — which can be loosely described as a cross between a rocket and a jet engine — was recently tested successfully in the laboratory. The design of this engine is based on elaborate calculations with Cray supercomputers that could not have been done 10 years ago, and possibly still cannot be done in a reasonable time anywhere in the world except in the United States.

The test points the way to a space-plane the size of a 707 — the so-called trans-atmospheric vehicle or TAV — that can take off from an airport, go into orbit, return to Earth, and land again at an airport. The SCRAMJET holds the promise of reducing the cost of putting heavy weights into orbit from thousands of dollars a pound (current shuttle prices) to tens of dollars a pound.

This may be the most important technical achievement in the SDI program to date, because a decrease in the cost of orbiting payloads by a factor of 100 will tilt the ratio of costs of a space-based missile defense irrevocably in favor of the defense over the offense. It is fair to say that with this kind of reduction in the cost of orbiting payloads the Soviets can never hope to overwhelm a U.S. defense by building up their offensive arsenal. At these lowered costs-to-orbit, decoy satellites can be orbited in substantial numbers, decreasing the vulnerability of the U.S. defensive system.

Opponents of a missile defense, of course, argue that the Soviets will simply develop countermeasures to overwhelm or "end-run" a U.S. strategic shield. That's simpler said than done.

The technology to defend the American people and our military and commercial resources from enemy missiles appears within our reach.

No wonder the Soviets are trying desperately to kill SDI at the "bargaining" table.

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*Robert Jastrow, founder of NASA's Goddard Institute for Space Studies, is a professor of earth sciences at Dartmouth College and adjunct scholar at The Heritage Foundation in Washington. Frederick Seitz is president emeritus of Rockefeller University in New York and a past president of both the National Academy of Sciences and the American Physical Society. This essay is based on a paper they delivered recently at The Heritage Foundation, under the co-sponsorship of the George C. Marshall Institute.*

STATEMENT ON SDI BY THE SCIENCE AND ENGINEERING COMMITTEE FOR A SECURE WORLD

At present the American people, by past government policy and to some extent by previous limitations of science and technology, have essentially no defense whatsoever against a nuclear missile attack or even a single accidental launch. The U.S. can only respond to an approaching Soviet first strike by killing millions of Soviet citizens in revenge, or by doing nothing.

Not only America, but the whole world lives with the fear and insecurity caused by the unstable balance of nuclear terror. This "balance" rests on the premise that both the U.S. and the Soviet Union follow the controversial doctrine of Mutually Assured Destruction--a doctrine rendered increasingly obsolete by powerful new Soviet missiles and technological advances on both sides.

The genius of American scientific and engineering professionals helped, however well meaning, create this world of nuclear terror. But today scientists and engineers from America and around the world have the opportunity to play a positive and critically important part in reducing and perhaps eventually eliminating the threat of nuclear war by means of America's Strategic Defense Initiative program.

As professionals trained in scientific methodology, we believe that the feasibility of a scientific or technical

proposal should not be judged in advance of proper research, experimentation and testing. Therefore, we believe that the Strategic Defense Initiative should not be hastily, unscientifically or ideologically rejected without this necessary thorough evaluation to determine its feasibility, its effectiveness and practicality--which is the very purpose of the SDI program.

Indeed, we ask our fellow scientists and engineers, is it not our responsibility as professionals and as concerned human beings to utilize our talents and energies now to see if we can render the nuclear threat functionally ineffective and therefore obsolete?

New technological breathroughs have significantly increased the prospect that the U.S. can successfully devise effective systems which will destroy attacking Soviet nuclear missiles long before they can come close to their targets in America, Europe or elsewhere. Included are such things as electronic miniaturization, super computers, infrared sensors,, "rubber mirrors", greatly enhanced laser beam power, the scramjet concept, and optical synthetic aperture imaging. These and other recent scientific and engineering achievements are providing the world with the possibility that the nuclear superpowers can move away from reliance on the threat of using nuclear weapons designed for the mass destruction of humanity in order to maintain security, and instead to reliance on defensive weapons designed to increase stability in periods of crisis, to protect countries from attack,

and to save lives.

The Strategic Defense Initiative (SDI) undertaken by President Reagan and the Congress seeks to utilize such new technological means to turn America's strategic military policy away from the unreliable, outdated MAD doctrine and its death dealing nuclear missiles, to a Mutually Assured Survival policy based on new, life protecting defensive systems.

As such, SDI embodies a strategy surely ethically superior to the MAD policy, as well as a concept of strategic deterrence that is very likely more sound from a military standpoint.

By developing the defensive means to shoot down Soviet (or other) nuclear missiles or warheads in space or the atmosphere before they explode on earth, SDI is intended to significantly increase America's deterrence to a Soviet nuclear attack, as well as to eliminate the danger from an accidental launch. Even a less than 100% perfect defense system could nonetheless render an attack militarily ineffective, and therefore greatly reduce the probability that an attack would ever be launched in the first place. In the quite unlikely event that an attack did occur, strategic defenses would tremendously reduce the loss of life and damage that would otherwise result without any such defense system in place.

The SDI program is also looking into the incorporation of advanced defenses against bombers and cruise missiles, as well as

shorter range nuclear missiles, into its systems.

SDI is not designed to cause a war in the heavens, as some charge, but to prevent nuclear war on earth. It would not lead to the militarization of space, which was already militarized by the first sputnik satellite and the first ICBM. Instead, SDI is intended to render space and the atmosphere militarily useless for nuclear missiles--to stop nuclear weapons in space so they cannot hit the earth.

The fact that the Soviet Union began serious research, development, and testing of advanced strategic defense systems some 10 years before the U.S., and is continuing to expand its offensive nuclear capabilities, makes the Strategic Defense Initiative more accurately a response to this Soviet effort and buildup.

Furthermore, even without additional technological advances on its part, growing evidence indicates that the Soviet Union is producing the capability, in violation of the ABM Treaty, to rapidly deploy a non-exotic strategic defense system of anti-ballistic missile (ABM) missiles. This defense system could be effective against a ragged U.S. retaliation in response to a Soviet first strike on U.S. nulcear weapons. It is estimated that the Soviet Union could deploy such a system by the end of this decade, regardless of whether the U.S. proceeds with its SDI. (See "Soviet Strategic Defense Programs", Departments of State and Defense, October 1985, etc.) Such a development could significantly enhance

the Soviet Union's nuclear blackmail capability and tempt it in very dangerous new ways.

These developments make the case for America's SDI effort an even more compelling one. Indeed, it can be argued that it is imperative for America's continued security and world peace that the SDI Research and Development program proceed with all deliberate speed.

At the same time, we believe that in the long run the most realistic and best path towards international stability, better U.S.-Soviet relations, and world peace is likely to be found in the United States and the Soviet Union engaging in a mutual transition from offensive strategic weapons to defensive ones, aimed at the flight corridors of potentially approaching nuclear weapons, rather than at human beings. Such a change in policy would vastly increase real security for both countries and therefore considerably reduce fear and mistrust on both sides.

For the above reasons, therefore, it is our judgement that the Strategic Defense Initiative program is worth pursuing and deserves the full support of the scientific community, Congress, and the American people.

Under the less restrictive interpretation of the ABM Treaty of 1972 which the U.S. government has stated is the correct one, the necessary testing of potential defensive systems can and should be done so that Congress has the required information

about the effectiveness of particular systems in order to make a sound decision concerning eventual deployment.

If Strategic Defenses prove to be feasible and practical after careful testing and assessment of costs and effectiveness--particularly in relation to possible Soviet counteractions--and in light of Soviet SDI programs, we recommend that a new ABM Treaty be negotiated which embraces Strategic Defenses, and also equitable, verifiable reductions in offensive nuclear weapons. Such a treaty should encourage mutual deployment of defensive systems so that the era of Mutually Assured Survival, instead of Destruction, can be ushered in cooperatively.

In the absence of Soviet agreement to such a new treaty, and in view of the extensive Soviet work on advanced strategic defenses and Soviet violations of the current treaty, U.S. withdrawal from the Treaty--in "the supreme interests" of the American people (to use the terms of the Treaty itself)--and deployment of its own strategic defenses should be seriously evaluated. Unilateral U.S. compliance with the existing treaty would serve neither America's interests nor the world's.

In conclusion, as professional scientists and engineers, we want to express our earnest hope that history will record that in our day America's and the world's best scientific and technical minds sought to develop the technology which helped humanity move back from the nuclear precipice--and succeeded. We can do no less.

Science and Engineering Committee
for a Secure World
P.O. Box 76042
Washington, D.C. 20013-6042

# NEWS

FOR IMMEDIATE RELEASE

CONTACT: JOHN KWAPISZ
(202)547-5580

## NEW GROUP OF SCIENTISTS AND ENGINEERS ENDORSES "STAR WARS" AT SENATE HEARING

WASHINGTON, May 9, 1986. In testimony to the Senate Appropriations Defense Subcommittee Friday the spokesman for a new committee of some 80 scientists and engineers, including a number of prominent figures, announced its formation and its strong support for President's Strategic Defense Initiative program (SDI -- mislabeled "Star Wars" by some). SDI's goal is to develop a defensive system to destroy attacking enemy nuclear missiles before they can explode on United States territory.

Called the Science and Engineering Committee for a Secure World, the group says that:

> new technological breakthroughs have significantly increased the prospect that the U.S. can successfully devise effective systems which will destroy attacking Soviet nuclear missiles long before that can come close to their targets in America, Europe or elsewhere.

In a veiled reference to scientists critical of SDI, the group says that "the feasibility of a scientific or technical proposal should not be judged in advance of proper research, experimentation and testing. Therefore, we believe that the Strategic Defense Initiative should not be hastily, unscientifically or ideologically rejected" without such research and testing.

The Committee's acting chairman is Dr. Fred Seitz, former president of The National Academy of Sciences and president emeritus of Rockefeller University. Dr. Martin Hoffert, chairman of the Department of Applied Sciences at New York University, presented the group's policy statement supporting SDI to the Senate Committee. Said Hoffert:

> We are confident that there are thousands of scientists and engineers across America and elsewhere who agree with us that it is unscientific and unwise to hastily oppose the promising Strategic Defense Initiative proposal at this early stage of its research and development, and who believe that the concept of developing a defensive system to protect our people from a nuclear attack makes good common and moral sense.

Among the distinguished members of the Committee are: Dr. Alvin Weinberg, former director of Oak Ridge National Laboratory; Dr. Eugene Wigner, Nobel Laureate in Physics; Walter Cunningham, former Astronaut;

Dr. Dixy Lee Ray, former Democratic governor of the state of Washington; Dr. Edward Lozansky, Director of the Andrei Sakharov Institute; Dr. Robert Jastrow, founder and for 20 years Director of NASA's Goddard Space Institute; Professor Harry Gatos, Material Science and Engineering Department, Massachusetts Institute of Technology; Dr. Hans Mark, Chancellor of the University of Texas Systems.

Appealing to their fellow scientists and engineers, the group also asked: "Is it not our responsibility as professionals and as concerned human beings to utilize our talents and energies now to see if we can render the nuclear threat militarily ineffective and therefore obsolete?

Citing new developments in SDI-related high technology, their statement suggested that, even at less than 100 per cent effectiveness, SDI has the potential for "significantly reducing and perhaps eventually eliminating the threat of nuclear war," or at the least saving tens of millions of American lives. In a reference to the ongoing Soviet "Star Wars" program and alleged Soviet violations of arms control treaties limiting these and other activities, the scientists and engineers said:

> it can be argued that it is imperative for America's continued security and for world peace that the SDI Research and Development Program proceed with all deliberate speed..... it is our judgement that the Strategic Defense Initiative program is worth pursuing and deserves the full support of the scientific community, Congress and the American people.

In a rebuttal to SDI critics, their statement points out that:

> SDI is not designed to cause a war in the heavens, as some charge, but to prevent nuclear war on earth. It would not lead to the militarization of space, which was already militarized by the first sputnik satellite and the first ICBM ....(but would) render space and the atmosphere militarily useless for nuclear missiles -- to stop nuclear weapons in space so they cannot hit the earth.

The scientists and engineers advised Congress that, in their view, a U.S.-Soviet "mutual transition" from offensive nuclear weapons to non-threatening defensive systems "would vastly increase real security for both countries and therefore considerabley reduce fear and mistrust," and would lead to "international stability, better U.S.-Soviet relations and world peace."

But absent Soviet agreement to a new arms control treaty embracing both strategic defenses and reductions in offensive nuclear weapons, and assuming that SDI proves to be practical and cost effective, the scientists

and engineers recommended a controversial proposal: that U.S. withdrawal from the ABM (Anti-Ballistic Missile) Treaty "in the supreme interests of the American people," and deployment of U.S. strategic defenses "be seriously evaluated. Unilateral U.S. compliance with the existing treaty would seriously serve neither America's interests nor the world's."

Senator Ted Stevens (Alaska), Chairman of the Defense Appropriations Subcommittee told Hoffert that "we welcome the opportunity to work with the Committee," and said he would alert members of Congress about its formation. He also asked that the new group provide his subcommittee with some historical research on Soviet work on strategic defense technologies.

-30-

# Center for Peace and Freedom

214 Massachusetts Ave., N.E., Suite 500
Washington, DC 20002
(202) 547-5607

May 16, 1986

Mr. Max Green
Office of Public Liaison
The White House
196 OEOB
Washington, D.C. 20500

Dear Mr. Green:

Enclosed is material on the Science and Engineering Committee for a Secure World which you requested. Included is a packet of materials sent to prospective members as well as a Press Release and testimony given at the Senate Defense Appropriations Subcommittee hearing last Friday by one of the group's spokesmen, Dr. Martin Hoffert.

With kind regards,

Mary Claire Kendall

Mary Claire Kendall

# Center for Peace and Freedom*

214 Massachusetts Ave., N.E., Suite 500
Washington, DC 20002
(202) 547-5607

April 15, 1986

TO: Interested Persons
FROM: John Kwapisz, Executive Director
RE: Science and Engineering Committee for the Strategic Defense Initiative

I am writing to inform you about the Science and Engineering Committee for a Secure World which is in support of the Strategic Defense Initiative research and development program.

The Committee, which now has over 35 members, is in the final stages of formation before going public within the next week or two. A partial listing of those involved in it is enclosed.

On behalf of the members, I invite and ask you to join the Committee. I and the Center are currently acting as administrative coordinator for the Committee.

Membership requires no fee or obligation. As members of the Committee, scientists and engineers will receive periodic mailings of information on SDI and notice of significant related events. (If you are interested in speaking or being interviewed or writing about SDI or have written something on it, please let me know.)

New members need have no prior experience in, nor expert knowledge of, the SDI and its controversies--nor will they be required to gain such experience or expert knowledge in the future--in order to be associated with the Committee and its principles. In particular, they do not need to be physicists or aerospace engineers to belong to it.

What is required is professional training in scientific methodology and the belief that the feasibility of a promising scientific or technical proposal should not be judged in advance of proper research, experimentation, and testing.

Enclosed is the Committee's basic statement on SDI. We received a number of valuable suggestions for changes from signers last Fall, which we utilized in revising it. Also, new public developments and issues have been factored into the statement.

The statement is now more comprehensive and can be viewed as a policy or position paper. It will probably be reproduced later in a brochure format. A much shorter, simpler version will be

* The Center is part of the Coalition for S.D.I.

utilized as a petition to be circulated by the Committee.

I have sent you several copies so that you can circulate them to potential members. You, or they, should call me collect to notify me about becoming a member at (202) 547-5607, as time is of the essence. Members should also mail in the enclosed form.

We want to go public with the Committee by May 1, but to do so we want to have at least 50 members/signers. It is important to have additional people signed on by then so that the statement will be given more credence and attention by the media and Congress.

The Committee and its statement is designed to show credible, respected scientific and engineering support for the SDI program, and to increase public awareness of its importance. Your participation in it is important and helps to make this public education effort more successful.

Thank you very much for your support and cooperation.

Yours for a Secure World,

John Kwapisz

John Kwapisz, J.D.
Executive Director, CPF
Administrative Coordinator of
the Science and Engineering
Committee

JK/md

Encl

P.S. If you are with us, please try to recruit at least one more member from academia or the business community in the next two weeks.

# Science and Engineering Committee for a Secure World

**P.O. Box 76042**
**Washington, D.C. 20013-6042**
(202)547-5580


FOR IMMEDIATE RELEASE

May 19, 1986

ANNOUNCING THE

SCIENCE AND ENGINEERING COMMITTEE FOR A SECURE WORLD

The Committee was formed in support of the Strategic Defense Initiative program to develop effective, deterring protection from a nuclear attack for the U.S. and its allies. It was recently established (May '86), with some 80 scientists and engineers as founding members. (See attached list).

It will seek to inform the public about the Strategic Defense Initiative and will undertake the following effort:

1) Demonstrate to the public that there is significant support for SDI from informed, respected and articulate scientists and engineers.

2) Establish a responsible academic, scientific and engineering base of support for the Strategic Defense Initiative program.

3) Maintain contact with and supply information to the media relating to SDI and our activities.

4) Provide the media and others with a timely source of interviews and speakers concerning SDI and related issues.

5) Communicate with fellow scientists, engineers and science and engineering groups, etc. on a regular basis.

6) Sponsor factual reports and professional conferences concerning SDI and related issues.

7) Prepare and publish critiques of materials by opponents of SDI in terms of errors, omissions, bias, faulty reasoning, etc.

Dr. Fred Seitz, former president of the National Academy of Sciences and president emeritus of Rockefeller University, is the acting chairman of the group.

Listing of the Founding Members of the Science and Engineering Committee for a Secure World: (organizations listed for identification only)

Dr. Fred Seitz
former President of the National Academy of Science
President Emeritus of Rocke feller University

Prof. Arthur Broyles
Dept. of Physics
University of Florida

Prof. Martin Hoffert, Chm.
Dept. of Applied Science
New York University

Dr. Eugene Wigner
Dept. of Physics
Princeton University

Prof. Robert Jastrow
Dept. of Earth Sciences
Dartmouth

Prof. Fred Singer
Dept. of Physics
George Mason University

Prof. Robert Clack, Emeritus
Nuclear Engineering
Kansas State University

Dr. Edward Teller
Hoover Institution
Stanford University

Dr. Hugh Ellsaesser
Atmospheric & Geophysical Sciences
Lawrence Livermore National Laboratory

Prof. Kenneth Bell
Dept. of Chemical Engineering
Oklahoma State University

Dr. Emma Brossard
Director of Policy Analysis
Center for Energy Studies
Louisiana State University

Dr. Hans Mark, Chancellor
University of Texas System

Dr. Alvin Weinberg
(former Director, Oak Ridge National Laboratory)
Institute for Energy Analysis
Oak Ridge Associated Universities

Dr. John A. Wheeler
Dept. of Physics
University of Texas

Dr. Robert McCrory
Dir., Laser Energetics
University of Rochester

Walter Cunningham
former Astronaut
Houston, Texas

Dr. Edward Lozansky (Physics)
Dtr, The Sakharov Institute
Washington, D.C.

Dr. Robert Whitelaw
Dept. of Mechanical Engineering
Virginia Polytechnic Institute

Dr. Harold Agnew, former Director
Los Alamos National Laboratory
San Diego, CA

Dr. Evgene Shustorovich
Quantum Chemistry
Rochester, NY

Prof. R. H. Miller
Aeronautics and Astronomy
M.I.T.

Dr. Merle Potter
Dept. of Mechanical Engineering
Michigan State U.

Dr. Gough Cooper Reinhardt, Physicist
and Arms Control consultant
San Leandro, CA

Dr. William Nierenberg
Scripps Institution for Oceanography
University of California, San Diego

Dr. William Orthwein
Dept. of Engineering, Mechanics,
and Materials
Southern Illinois University

Dr. Rudolf F. Kazarinov, Physics
Solid State Electronics
A T& T Bell Laboratories

Dr. Donovan H. Van Osdol
Department of Mathematics
University of New Hampshire

Dr. Elmer Hansen, Ph.D.
Asst. Prof. Mechanical Engineering
University of Florida

Ralph Burgess
Research Engineer
MIT

Professor Harry Gatos
Dept. Material Science & Engineering
MIT

Prof. Lev. B. Levitin, Ph.D.
College of Engineering
Boston University

Jack Howell, Managing Director
for Technical Affairs
American Society for Mechanical Engineers

Gary Kellogg, M.S., P.E.
Regional Engineer
Universal Engineering Testing Co.

Dr. Hans Coll, Ph.D.
Electrical Engineering
University of Colorado

Robert K. Squire, Ph.D., Physics
Eagle Research Group, Inc.
Arlington, VA.

Prof. Petr Beckmann, Ph.D.
Electrical Engineering
University of Colorado

Nicholas Zumbulyadis, Ph.D.
Physical Chemistry
Rochester, NY

Dr. John J. McKetta, Jr.
Dept. Chemical Engineering
University of Texas

Raphael G. Kazmann
Prof. Emeritus Civil Engineering
Louisiana State University

Dr. Raymond J. Krizek
Department of Civil Engineering
Technological Institute
Northwestern University

Dr. Harvey Smith
Department of Mathematics
Arizona State University

Dr. Bernard Piersma
Department of Chemistry
Houghton College

Dr. Robert Schreffler
Physics Consultant
Santa Fe, New Mexico

Gilbert Stubbs, M.A.E.E.
Aerospace Engineer
Wellesly, MA.

Dr. Joseph Douglass, Electrical Engineering
Falcon Associates
McLean, VA.

Dr. Bernell Stone
Computer and Systems Analysis
Georgia Institute of Technology

Samuel Cohen
Nuclear Engineering Consultant
Los Angeles, Calif.

Al Worden, former Astronaut
M.S. Aeronautics, Instrumentation Engineering
Orlando, Florida

Dr. Yuri Tuvim
Mechanical Engineering
Boston, Massachusetts

Dr. Joseph Weber
Department of Physics
University of Maryland

Dr. Igor Levin
Computer Science
Washington, D.C.

Dr. Carl Gottschall, Jr.
Department of Chemistry
University of Colorado

Dr. Marcello Alonso, Physics
Director, Fla. Inst. of Technology
Research and Engineering

Dr. Wojciech Slusarek
Chemistry
San Diego, Calif.

Dr. Thomas Dillon
Chemical Physics
San Diego, California

Dr. Dixy Lee Ray, Ph.D.
former Chairman, U.S. Atomic Energy Commission
former Governor, State of Washington

Prof. David
Dept. of Physics
Purdue University

Prof. Rolf P. Scharenberg
Dept. of Physics
Purdue University

Dr. Robert Budwine
Physicist
Lawrence Livermore Laboratory

Prof. Neal C. Gallagher
School of Electrical Engineering
Purdue University

Prof. Paul Coleman
Institute Geophysics, Planetary Physics
UCLA

Margaret Renton
Systems Engineer
Systems Control Technology, Inc.

Prof. Gabriel Miller
Dept. of Applied Sciences
New York University

Hon. John H. Morse
M.S. Aeronautical Engineering
Former Deputy Asst. Sec'y of Defense

Dr. Cornelius Leondes
Engineering and Applied Sciences
UCLA

Professor Fred Decker, Emeritus
Dept. of Physics
Oregon State University

Dr. Jerry Pournelle
Aerospace Engineers
Board of Directors, L-5 Society

Perry Anthony
Research Assistant, High Energy Physics
Fermi National Accelerator Laboratory

Dr. Joseph Goldman
Dept. of Physic
American University

Dr. Fred Samson, Director
University of Kansas Medical Center
Kansas City, Kansas

Dr. Henry Miranda, Physicist
Optics Space Instrumentation
Bedford, Massachusetts

Dr. William R. Havender, Genetics
Specialist in Environmental Carcinogens
Berkeley, Calif.

Professor Sami Beraha
Dept. of Mathematics
Queens College, New York

Dr. Kenneth Watson
Scripps Institution for Oceanography
University of California, San Diego

Prof. John McCarthy
Dept. of Computer Science
Stanford University

Dr. Peter Vajk, Physicist
Space Energetics, Inc.
Walnut Creek, CA

Maxwell Hunter
Aerospace Engineer
San Carlos, CA

Current
Policy
No. 730

*Kenneth L. Adelman*

# SDI: Setting the Record Straight

United States Department of State
*Bureau of Public Affairs*
Washington, D.C.

*Following is an address by Kenneth L. Adelman, Director of the U.S. Arms Control and Disarmament Agency, before the Baltimore Council on Foreign Affairs, Baltimore, Maryland, August 7, 1985.*

It is a great pleasure to be here this evening before the Baltimore Council on Foreign Affairs. I know firsthand the valuable role such councils play all across the country—particularly in ensuring public awareness of critical issues. Separating fact from fiction in arms control and national security is essential to understand those issues.

The year 1984 is behind us. It was many things, but it was not at all the year George Orwell had depicted. Wars in sundry regions troubled us, but the perpetual wars of Orwell's imagination were nowhere upon us.

Rather, 1984 was most significant for what did not happen. On the 15th of May 1984, the world broke the modern-day record for length of time without major war in Europe—no mean accomplishment. The old record, just short of 39 years, was set between the battle of Waterloo (1815) and the outbreak of the Crimean War (1854).

The year 1984 marked another significant unfolding: the increasing discourse surrounding—and, at times, even enveloping—President Reagan's Strategic Defense Initiative, or SDI. This research program is designed to see if effective defense against nuclear weapons is possible. Over the coming years, the subject will surely come to dominate our discussions on arms control, deterrence, and military strategy—if, indeed, it has not already.

The starting point for any rational discourse on SDI—and many discourses on SDI have not been rational but have been wrapped in and warped by emotion—is a large dosage of modesty at predicting what science and technology can offer in the future. How many times in our history has human ingenuity overcome human expectations and even expert predictions?

To take just a few examples:

- Thomas Edison forecast:

> Fooling around with alternating currents is just a waste of time. Nobody will use it, ever. It's too dangerous . . . . Direct current is safe.

- Simon Newcomb noted in 1903:

> Aerial flight is one of that class of problems with which man will never be able to cope.

- Lee DeForrest argued in 1926 that:

> While theoretically and technically television may be feasible, commercially and financially I consider it an impossibility, a development of which we need waste little time dreaming.

- Admiral William Leahy, Chief of Staff to President Truman, warned in 1945 that:

> The [atomic] bomb will never go off, and I speak as an expert in explosives.

- One scientist argued in 1932 that:

> There is not the slightest indication that [nuclear] energy will ever be obtainable. It would mean that the atom would have to be shattered at will.

That scientist was Albert Einstein.

With these and many more examples, one cannot blithely accept the word of some self-anointed "experts" who tell us how a strategic defense can never work, can never be cost effective, can never be stabilizing.

SDI is a fetching subject which inevitably provokes eruptions. Any meeting that drags can be instantly brought to high drama just by mentioning SDI. Too often, however, the public debate is marked by flamboyant rhetoric and stark, unsupported conclusions. To make an impact in our open society, exaggeration seems unavoidable.

## Soviet Propaganda Against SDI

Internationally, the issue has been joined as well. Here, too, there is a good deal of emotion and rhetoric on the subject. And, not to be forgotten, the Soviet Union has launched a major propaganda campaign and strategy to stop or at least slow down SDI. The assault involves disinformation and misinformation—a form of "newspeak," to borrow again from *1984*. It conforms to Lenin's dictum that what happens outside the negotiating room is far more important than what happens within it.

The lines of Soviet propaganda against SDI often have curious inconsistencies. For example, they cast SDI as a dangerous and destabilizing move that will be met by Soviet counter-

measures, while at the same time saying it is useless and won't work. It can hardly be both—or, as you might ask, "If it won't work, why are the Russians so worried about it?"

But make no mistake about it: one of the Soviets' prime purposes is to try to abort U.S. research on SDI while maintaining their own programs. Not surprisingly, they are jumping into our national debate on SDI.

No such public debates, of course, are allowed in their closed system. This, too, leads to curious positions. They can argue, for example, that the "intent" of their own research program is for purposes other than strategic defense. At one point the Soviets claimed that their laser research was for medical purposes. The problem with that claim is that one of their major laser facilities at Sary Shagan is the size of a couple of football fields—not exactly the size or power for use in cataract or other surgery.

### Key Questions Concerning SDI

How should we respond to the numerous questions, concerns, misunderstandings, and even to this Soviet "newspeak"? The truth, I believe, is always the best answer. I wish tonight to address three key questions on SDI. As these issues are likely to gain more than less attention, we should focus on them now.

**First,** does SDI constitute a breach or anticipatory breach of the ABM [Anti-Ballistic Missile] Treaty?

**Second,** is SDI wrong in terms of strategic stability, the U.S. strategic position, or U.S. arms control objectives?

**Third,** is SDI ethically wrong?

**SDI and the ABM Treaty.** As to whether we are breaking or committing "anticipatory breach" of the ABM Treaty, the answer is flatly "no."

That treaty limits deployment of fixed, land-based ABM systems and prohibits development, testing, or deployment of space-based, sea-based, air-based, or mobile land-based ABM systems and their components. The treaty unmistakably leaves the research doors wide open. That was wise when the treaty was negotiated, and it is wise now in light of potentially promising new technologies. Research increases knowledge and, as Prime Minister Craxi of Italy put it recently, "You cannot put a brake on the human mind."

SDI is a research program only. It does not include development, testing, or deployment inconsistent with the ABM Treaty. President Reagan has made clear that the research efforts will be fully consistent with our international legal obligations, including the ABM Treaty. That requirement definitely affects the configuration of the SDI research program. It will be under constant review to ensure that consistency.

The research on defensive systems, as embodied in the President's initiative, is not only permitted under the ABM Treaty but was actively advocated by the Nixon Administration as a necessary safeguard against Soviet programs. When that treaty stood before the Senate, then Defense Secretary Laird noted that we would "vigorously pursue a comprehensive ABM technology program." While not necessarily as vigorous as this statement suggests, active research programs on ABM technology have been supported by every administration since 1972.

Critics of SDI argue that the research is "purposeful" and will lead to abrogation of the ABM Treaty. This is basically an argument of anticipatory breach.

Ironically, this argument assumes that we know exactly where technology developments will lead us and how they will affect us. That assumption, whether by critics or by proponents of SDI, is premature at best. No one has a crystal ball or crib sheet in this business. No decisions on development or deployment have been made. Indeed, they could not be made responsibly until the research efforts yield their results over the next several years.

> We are doing a lot of research to look at technological developments and their potential for defense against ballistic missiles. Can they work? Can they be cost-effective? Can they be made survivable? How will they impact on deterrence and strategic stability? We do not know answers to these questions today. That is what the major research program is all about.

At any rate, intent behind any research is simply not relevant to the ABM Treaty limitations. The framers made no distinction between permitted and prohibited research or between purposeful and nonpurposeful research. The treaty simply does not prohibit or constrain research in any way, shape, or form.

The Soviets know this and, before SDI came on the scene, they willingly acknowledged it. In a major statement before the Soviet Presidium in 1972, shortly after the treaty was signed, then Soviet Defense Minister Grechko stated that the ABM Treaty ". . . places no limitations whatsoever on the conducting of research and experimental work directed toward solving the problem of defending the country from nuclear missile strike."

Despite all the focus on SDI's effect on the ABM Treaty, the threats to the treaty lie elsewhere. They lie, first and foremost, in the Soviets' clear violation of the treaty by the location and orientation of a new, large radar at Krasnoyarsk in Siberia. This Soviet action is most disturbing, as the Soviets must have known we would detect such a massive structure, several football fields large. They had to have planned it in the 1970s, not long after signing the ABM Treaty.

The limitation on the construction of such radars was and still is considered a critical constraint of the ABM Treaty, since such radars are a long lead-time item for any nationwide defense, and that is a key prohibition in the treaty. One of our main objectives in the Geneva arms control talks is to reverse this erosion of the ABM Treaty.

And talk about "newspeak": both in public and in the negotiating rooms of Geneva, the Soviets attempt to deny us the right to do what the ABM Treaty clearly allows—that is, conduct research—while asserting a right for themselves to do what the treaty clearly prohibits—that is, construct the Krasnoyarsk radar.

**SDI and U.S. Arms Control Objectives.** Given that the SDI research program is consistent with the ABM Treaty, the most central question is: will SDI improve deterrence, strengthen stability, and reduce the risk of war?

Surely we all agree that such defenses should be developed or deployed only if they enhance strategic stability. The arguments on strategic stability and the offense-defense relationship were central to the debate in the late 1960s and early 1970s before signing on to the ABM Treaty. What we do not know, and what we need to look at in relation to SDI, is whether newly emerging technologies can change some of those considerations.

Let's look at a relatively simple example. For years it has been assumed—and correctly so—that defenses against ballistic missiles were not cost-effective. No matter how many defenses one side deployed, it would be cheaper for the other side to overwhelm those defenses with decoys or even with more offensive systems. We do not know if that generalization will hold true for future technologies.

We do know, however, that we must scrupulously guard against a vicious cycle of defensive efforts spurring the other side to yet more offensive weapons in order to saturate prospective defenses, and so on and so on. That

snowball effect would undercut stability and hinder deterrence.

One way to help this is by engaging the Soviets in frank and factual discussions on strategic stability and the offense-defense relationship. How might strategic defenses, if they prove feasible, enhance the security of both sides? How could the two sides cooperate toward such an end? What kind of transition would be necessary? Detailed talks on these subjects should minimize the possibility of misunderstanding. This is another major area we are pursuing in the Geneva talks.

The survivability of defensive systems is also a central criterion. Vulnerable systems or easy targets can provide incentives for preemptive or first strikes. They are the worst systems in a crisis. If defensive systems can be knocked out or overwhelmed easily, they provide no defense at all. Survivability is, thus, essential to SDI, and it alone will involve considerable research into both passive and active defense measures.

If new technologies do prove out and systems could prove cost-effective and be made survivable, they could be stabilizing, not destabilizing. We can surmise now that even a less than perfect defense could markedly reduce a potential attacker's expectation of success by reducing the likelihood that he might realize the objectives of his attack. And this, after all, constitutes the quintessence of deterrence.

We need not go far for examples. Less vulnerability of our command, control, communications, and intelligence capabilities is a critical component of a stronger deterrence; less vulnerability of our fixed land-based ICBMs [intercontinental ballistic missiles] also helps keep the peace. If cost-effective, survivable defenses could better protect these components, would we not be better off?

And what about a capability against accidental launch? How many of us recall the novel *Fail-Safe*? As Martin Anderson once described it:

> If you live in New York City or Washington and the sirens start wailing, it will be of little consolation to . . . learn that the Soviet Union has apologized profusely for the nuclear bomb that is going to explode.

Would we not all be better off if the President had the option of pushing a second button—one that could destroy incoming missiles—rather than only the button that would destroy people? An effective defense system could provide such a button.

So, is SDI worth the investment of scarce resources? I strongly believe so. If the research pans out, then a resulting program could strengthen deterrence based more upon defense against missiles than solely upon the threat of mutual annihilation. While we do not know what the future holds, we do know that the research effort is a reasonable bet. For some, SDI research stands at the very frontier of today's scientific and technological advancements—in computers, in sensors, in radars, in high-energy particle beams, and in lasers.

On the other hand—even if the technology does not pan out or systems do not prove cost-effective or cannot be made survivable—our SDI research is valuable for other reasons.

Greater understanding of the technologies, their potential, and their drawbacks can give us greater understanding of the threat to the United States—the threat emanating from the Soviets' active defensive programs and research. This is particularly vital in view of the Soviets' breakout potential in ABM systems. Not only have they constructed the permitted ABM system around Moscow, but they may be moving toward a nationwide ABM capability, contrary to the heart and soul of the ABM Treaty. They also have an extensive air defense program. They are engaged in vigorous research on lasers and neutral particle beams for strategic defenses.

They spend some 10 times more than do we on defensive programs overall. Surely the worst outcome would be to tie our own hands on research on defensive systems while the Soviets gained substantial advantage in this realm.

**The Ethics of SDI.** Finally, is SDI wrong from an ethical standpoint?

The ethics or morality of relying on nuclear deterrence is, as you know, one of the most critical issues of our times. As one who was a religion and philosophy major in college—and as one now deeply involved with nuclear arms control policies—I find the ethical considerations compelling.

The debate on the morality of nuclear deterrence—prompted and reinforced by the U.S. Catholic bishops' pastoral letter in 1983—and the debate on strategic defenses are remarkably similar. We deploy nuclear weapons, not to use them but to make war against the United States and our allies far, far less likely. In this same vein, if we find out that some defensive systems can reduce the risk of war, they, too, would thereby be morally justified. We cannot simply sit back and forever assume that the only deterrent is the threat of mutual annihilation.

It is not coincidental that over 1,000 clergymen have publicly endorsed SDI research. The declaration claimed "that if a non-nuclear, genuinely defensive system is feasible, then its deployment . . . is not only morally justifiable, but perhaps even obligatory for the American people and their government." To the extent that defensive systems can actually reduce the risks of war—through accident, miscalculation, or deliberate design—it would surely be the right thing to do.

### U.S. Nonproliferation Efforts

No task is more important to President Reagan than dealing with the threat of nuclear weapons and nuclear war. As this month marks the 40 years since the use of such weapons over Hiroshima and Nagasaki, we need to rededicate ourselves to the goals that they never be used and that the threat eventually be eliminated.

That task requires a broad and vigorous strategy. Not least in this strategy is our effort to prevent the further spread of nuclear weapons. It would be ironic were we to succeed in reducing substantially U.S. and Soviet nuclear arsenals only to confront a world of many small nuclear powers.

Just over 20 years ago, many smart people feared that the spread of nuclear weapons to dozens of countries was simply unavoidable. President Kennedy, for example, warned of a world of 20–25 nuclear-weapon states by 1975. In 1958 the National Planning Association predicted that every state with a significant military capability would also possess "the bomb."

These predictions have not come true. Instead, working together, the United States and other countries have built up a set of norms, practices, and institutions to prevent the further spread of nuclear weapons. Political alliances and security guarantees have been nurtured and strengthened, reducing incentives for seeking security through nuclear weapons. The safeguards of the International Atomic Energy Agency provide essential confidence that peaceful nuclear activities are not being misused for military purposes. Export controls and guidelines have been put in place to make it harder for countries seeking nuclear explosives to acquire the needed material and equipment.

A critical cornerstone in this whole foundation is the Non-Proliferation Treaty (NPT). It is the most widely accepted arms control treaty to date, with more than 125 states party to it.

Two events—one recent and one upcoming—are important in this never-ending battle against the spread of nuclear weapons. President Reagan's decision last month to authorize signature of a nuclear cooperation agreement between the United States and the People's Republic of China signifies a major event in our nonproliferation effort. It helps ensure that China is part of the nonproliferation solution, not part of the problem.

During the 1960s and 1970s, China rejected nonproliferation norms. It actually portrayed proliferation in a favorable light by openly declaring that the spread of nuclear weapons around the globe would diminish the power of the United States and the Soviet Union and would enhance the opportunities for revolution. China denied that a world of more nuclear-weapon states would be riskier.

China also undertook no international legal obligations, and had no policy, to require safeguards and other controls on its nuclear exports. This naturally quickened our concerns about Chinese actions that could help other countries acquire nuclear explosives. Clearly, herein lay the potential for great harm to global nonproliferation efforts, in both word and deed. Against this background, the United States entered into talks—first in 1981 and then more intensively in 1983—on nuclear cooperation.

With the change in Chinese leadership, with its momentous impact on world politics, we have also seen changes in China's thinking on arms control. Over the past 2 years, the Chinese Government has taken a number of important nonproliferation steps. It has pledged neither to engage in nuclear proliferation nor to help other countries develop nuclear weapons. China joined the over 100 members of the International Atomic Energy Agency and made clear that it would require agency safeguards on its nuclear exports. The Chinese also made it clear that they will implement their policies in a manner consistent with the basic nonproliferation practices that we and others support so vigorously.

In the short span of 2 years, China has embraced nonproliferation policies and practices, which it had eschewed so vociferously for a quarter of a century. This positive turnabout is of historic significance in efforts to prevent the spread of nuclear weapons.

We, too, can take a measure of pride in this. I believe the lengthy discussions by us and other suppliers with China, combined with the prospect of agreements for peaceful nuclear cooperation, contributed heavily to these Chinese actions.

The second event in the never-ending battle against the spread of nuclear weapons is the Non-Proliferation Treaty Review Conference later this month. More than 125 parties to this treaty will convene in Geneva for 4 weeks to take stock, to ask how well have the treaty's goals been met.

There is little doubt that the treaty has been successful in helping avoid what President Kennedy feared—namely, a world of many nuclear-weapon states. Indeed, since the treaty came into force in 1970, only one additional country has detonated a nuclear explosive. This contrasts with the more than 125 countries that have joined the NPT. The NPT can and will stand on its merits; it is an arms control success.

Considerable progress has been made as well in fulfilling the treaty's goal of making available the benefits of the peaceful atom, especially to developing countries. Many NPT parties now make use of the atom in agriculture, in industry, in medicine, in science, in research, and as a source of energy. We believe that NPT parties should receive special treatment; we have sought to give them preference in funding technical assistance, in providing training, in facilitating exports, in funding power projects, and in other ways.

Less progress than hoped for or desired has been made toward the treaty's goal of an "end to the nuclear arms race." But let there be no doubt about the Reagan Administration's commitment to that goal. We are redoubling efforts to reduce radically both U.S. and Soviet nuclear arsenals. If the Soviets would ever cooperate as well on reducing our respective nuclear weapons as they do on nonproliferation, such reductions could be realized. This would be the best first step in the treaty's vision—and President Reagan's vision—of a world without nuclear weapons. ■

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# Illinois Judge Seeks Arrest of LaRouche Nominee

SKOKIE, Ill.—A Cook County judge issued an arrest warrant yesterday for Janice Hart, Illinois' Democratic nominee for secretary of state, accusing the supporter of Lyndon H. LaRouche Jr. of "thumbing her nose" at the court by failing to appear on a disorderly conduct charge.

Hart, 31, was charged after she and a companion disrupted a lecture by Milwaukee Archbishop Rembert Weakland last May by handing him a piece of raw liver. Conviction carries a maximum penalty of a $500 fine.

Judge Morris Topol called Hart's failure to appear "a willful act" and scheduled further court action for June 23.

A spokesman at LaRouche's National Democratic Policy Committee headquarters said Hart is in West Germany, campaigning for candidates in parliamentary elections June 15.

## Arab Scholar, Wife Killed

■ WYNCOTE, Pa.—An Islamic scholar and his wife were stabbed to death yesterday and their daughter seriously wounded with a "15-inch survival-type knife," and the FBI joined the investigation because of the husband's links to the Arab world.

Ismail al Faruqi, 65, a Temple University religion professor, and his 59-year-old wife, Lois, an art scholar, were found dead with multiple stab wounds in their suburban Philadelphia home, police said. Their 27-year-old daughter was found on the kitchen floor, bleeding from wounds to the chest and arms.

There were signs of a break-in, but Lt. Detective Robert Krauser said, "It's hard to say if anything was taken."

## Seeking to Bar Waldheim

■ LOS ANGELES—The Simon Wiesenthal Center said it was giving out 1 million postcards, urging they be mailed to President Reagan in a bid to bar Austrian presidential hopeful Kurt Waldheim from the United States.

The postcards display a 1943 photo of Waldheim in a German army uniform and a 1975 picture of him as U.N. secretary general. The New York-based World Jewish Congress has accused Waldheim of signing documents dealing with the killing of civilians in Yugoslavia and complicity in the deportation of Jews from Greece during his service in Hitler's army.

## Armed Suspect Killed

■ NEW YORK—A handcuffed man drew a pistol and shot two police officers from the back seat of their cruiser, wounding one critically, then was fatally shot by officers in a following car as he tried to flee, officials said.

Plainclothes officers had arrested three men, Police Commissioner Benjamin Ward said. One was handcuffed and placed in the back seat of a cruiser. Another car followed, carrying the other suspects.

En route to the police station, the suspect in the first car pulled a hidden .45-caliber pistol, twisted his body to maneuver his handcuffed hands into position and fired at the officers in the front seat, Ward said.

The trailing police "saw the car swerve and the officers fall out," Ward said. "They saw the suspect get out, still handcuffed and carrying the gun." They fired at the suspect, killing him.

## Victim Fights Mugging

■ NEW YORK—A bicyclist who allegedly tried to snatch the purse of an 87-year-old woman was thwarted when she beat him with her umbrella.

"I wanted to go and whack him some more when he was down, but they pushed me away. They wouldn't let me do that," said Lady Vera Tucker, the widow of Sir Charles Tucker, who was knighted for philanthropic work in England. She suffered only minor injuries in Monday's incident.

A 38-year-old man was arraigned on charges of robbery, possession of stolen property and resisting arrest.

## AIDS Research Funded

■ NEW YORK—The American Foundation For AIDS Research, headed by actress Elizabeth Taylor, awarded more than $1.1 million, including part of a $250,000 donation from the late Rock Hudson, to fund grants for AIDS research.

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# Why Strategic Superiority Matters

*Robert Jastrow*

When I was a young physicist I spent a year working on nuclear-physics problems with Robert Oppenheimer at Princeton. I then went out to the Lawrence Radiation Laboratory in Berkeley, where I shared an apartment for a time with Harold Brown, who later became Secretary of Defense in the Carter administration. My friendship with Dr. Brown brought me into contact with Herbert York and the weapons physicists in Berkeley, and that led to a job on the Greenhouse project.

The Greenhouse experiment, which took place in 1951 on Eniwetok atoll in the Pacific, was supposed to create the first man-made thermonuclear reaction, using the energy of a 500-kiloton atomic bomb to ignite a fraction of an ounce of deuterium and tritium placed in a small adjoining chamber. The project was more of a public-relations stunt than a genuine experiment, because everyone knew beforehand that it was pretty certain to work; using a huge atomic bomb to ignite the little vial of deuterium and tritium was like using a blast furnace to light a match. According to my understanding at the time, Edward Teller was trying to get support for the H-bomb project, and since he could not figure out how to build an H-bomb, he thought up the Greenhouse project instead, as a demonstration piece for the people back in Washington.

In any case, my job on Greenhouse was to calculate the temperature of the reacting mixture of deuterium and tritium. As I recall, it was supposed to hit a million degrees or so, which is beyond the range of an ordinary thermometer. As the house theorist, I applied the methods of the branch of physics known as radiative transfer theory to compute the temperature inside the vessel of deuterium and tritium, using measurements on the amount of radiation coming from the outside. It was the kind of calculation astronomers do routinely for the hot gases in stars, and later on I was to do it quite often in NASA, as a part of my work in astrophysics and planetary science.

Robert Jastrow was the founder of NASA's Institute for Space Studies and served as its director until his retirement in 1981. He is now professor of earth sciences at Dartmouth. His most recent book is *The Enchanted Loom: Mind in the Universe.*

The Greenhouse assignment led to a trip to the Pacific and a close look at a 500-kiloton atomic explosion. I also had a chance to work with some very bright people, such as Drs. Teller, York, and Brown, and later on, at Los Alamos, with Stanley Ulam, George Gamow, and others. And, of course, there was a great deal of government and Atomic Energy Commission politics swirling around the figures of Oppenheimer, Teller, and Lawrence, of which I had an intimate and revealing worm's-eye view. But that is another story.

I left nuclear research in 1958 when I joined NASA. I did not think much about it, or about nuclear bombs, for the next twenty years until, three years ago, I happened to come across a *New Yorker* article on nuclear weapons and SALT by Daniel Patrick Moynihan (November 19, 1979). In reading Senator Moynihan's article, I became aware for the first time that the policies of the United States for protecting its citizens from destruction are based on a flawed premise.

The premise is that the Soviet Union will be deterred from a surprise nuclear attack on the United States by the knowledge that such an attack would trigger a devastating American counterattack. And, of course, *we* are deterred from an attack on the USSR by the knowledge that the Soviets maintain a similar arsenal. The result is a nuclear standoff, and world peace.

In other words, each side holds the other side's civilian population as hostages. Holding hostages, and threatening their massacre, are time-honored methods for achieving one's objectives in war, but they have never been suggested before as a means of keeping the peace. The proposal for mass exchange of hostages is a simple but brilliant strategy conceived by American intellectuals who were trying to figure out a solution to a terrible problem: how does the U.S. protect itself from nuclear destruction in an age in which missiles vault the oceans and the concept of Fortress America no longer has meaning?

The academicians who thought up this idea called it Mutual Assured Destruction, or sometimes simply MAD. It makes very good sense, as you would expect, since the policy was formulated by some of the most brilliant scientists and academicians who have ever served in an advisory

capacity to our government. The trouble is that MAD is a theory, and like all theories, it depends on an assumption. This assumption has turned out to be false.

The assumption behind the theory of Mutual Assured Destruction is that both the United States and the USSR will freely offer up their populations for massacre. But this requires that each country give up all attempts to defend its own people. In other words, the two countries must agree that neither will have a civil-defense program, and neither side will try to shoot down the other side's missiles.

On the face of it, this proposal sounds peculiar. What does it mean, as Senator Moynihan wrote, to say "we must not defend ourselves because if we do the enemy will attack"? As a physicist once remarked of Einstein's theory of relativity, when you first hear this line of reasoning you think you must have misunderstood it, and when you understand it you think you must have misheard it.

Actually, MAD is a logical response to the problem of nuclear war, and it could have worked, *if* the Russians had been reasonable and seen matters our way—if they had been willing to offer up their people as hostages, just as we have done. But the Soviet Union saw things differently.

It is now clear—in fact it has been clear for a decade—that while for many years the American government adopted the strategy of Mutual Assured Destruction proposed by our scientists and academicians, the Soviet government rejected it. The USSR undertook to do exactly what our strategists say it is supposed not to do: it implemented large programs for defending its citizens from nuclear attack, for shooting down American missiles, and for fighting and winning a nuclear war. The result, as Senator Moynihan has said, is "a policy in ruins," and the greatest peril our nation has faced in its 200-year history.

WHY did the Russians reject the American plan for avoiding nuclear war? Perhaps the reason is that the strategy of Mutual Assured Destruction is very logical, and therefore appealing to a scientist; it is what a physicist might call a "sweet" solution to a difficult problem. Now scientists have an important voice in formulating American defense policy; after all, a physicist became Secretary of Defense in the Carter administration. But in the Soviet Union scientists carry little or no weight in defense matters. Andrei Sakharov—the great colossus of Soviet atomic weaponry, with the stature of Oppenheimer and Teller rolled up in one—tells the story of a banquet attended by Soviet generals and scientists following the first test of a Russian H-bomb in 1955. Sakharov, who had designed the bomb and was responsible for its success, toasted the achievement with a wish that the Russian bomb would never be exploded over cities. The general in charge of the tests replied to the effect that the job of a scientist was to make the bombs, and how they were used was none of his business.

In any case, the Russians have made it clear that they think the theories of the American scientist-advisers are crazy, and they want no part of them. Their rejection goes beyond the concept of Mutual Assured Destruction itself; they reject the view, so widely held in America, that the mass detonation of nuclear weapons would mean the end of civilization, and, therefore, that these weapons are not useful tools of military policy.

At one time, Soviet thinking on nuclear war did echo American ideas on the impossibility of a nuclear victory. That was in the 1950's, soon after Stalin's death, when Malenkov, who was then the Soviet premier, announced that nuclear war could lead to the "destruction of world civilization." But Malenkov was severely criticized by Khrushchev, who said he had it wrong; only capitalism would perish in a nuclear war. By the mid-1960's the debate was over, and the elements of Soviet nuclear policy were set in concrete. In 1979, Secretary of Defense Brown confirmed that since 1963, "The Soviets have had a policy of building forces for a preemptive attack on United States ICBM's."

And in fact Soviet military writings make it plain that the entire war-fighting posture of the Soviet General Staff rests on the mass use of nuclear missiles:

> The most important task of the General Staff in preparing for a modern war is the detailed planning of employment of nuclear weapons by all services of the armed forces.*

> The armed forces of the Soviet Union . . . must be prepared above all to wage war under conditions of the mass use of nuclear weapons.†

> The basic method of waging war will be massed nuclear rocket attack. . . .**

> Nuclear missile strikes . . . and the ability to use them before the opponent does, are the key to victory.††

> It is recommended that the nuclear strike be launched . . . unexpectedly for the enemy. Preemption in launching a nuclear strike is ex-

* *Voyennaya mysl'* ("Military Thought"), October 1964, p. 23; quoted in *Soviet Strategy for Nuclear War*, edited by J.D. Douglass, Jr. and A.M. Hoeber (Hoover Institution Press, 1979). According to Douglass and Hoeber, *Voyennaya mysl'* is a confidential journal designed for internal use by the Soviet General Staff and officers of the Soviet armed forces.

† V.D. Sokolovskiy, *Voyennaya strategiya* ("Military Strategy"), p. 193, edited by H.F. Scott (Crane, Russak, 1975).

** *Ibid.*, p. 210.

†† Byely *et al.*, *Marxism-Leninism on War and Army* (*A Soviet View*), trans. U.S. Air Force, Soviet Military Thought Series No. 2 (Government Printing Office), p. 217; quoted in Douglass and Hoeber, p. 38.

pected to be the decisive condition for the attainment of superiority.*

SOME American scientists and arms-control experts find it hard to believe that the Russians can actually hold these views on the massive use of nuclear weapons. They feel that if the Russian generals think they can fight and win a nuclear war, the reason must be that the generals have not thought the question through carefully. "I don't think we should substitute their judgment for our common sense," said Paul Warnke about the matter. Warnke, who was President Carter's chief arms-control negotiator, thought Russian thinking about emerging victorious from a nuclear war was "primitive," and the United States "ought to educate them into the real world of strategic nuclear weapons."

But the Russians have refused to be educated. Around 1963, in pursuit of their objective of winning a nuclear war if it should break out, they began a massive program for building nuclear bombs, missiles, and submarines. In the next few years, American satellites photographed new missile silos sprouting all over the Soviet Union. In 1967, the Russians built 160 new silos; in 1968, they added 340 more; in 1969, they drew abreast of the United States. By then each side had about 1,000 silos and a like number of missiles.

None of this bothered American strategists because their policy of Mutual Assured Destruction required that each country must have enough nuclear destructive power to kill a lot of the other fellows. Secretary of Defense Robert McNamara had figured out that we had enough bombs to kill at least 50 million Russians directly in a mass nuclear attack, in addition to millions who would die later from radiation poisoning. He stated that he thought this was sufficient to deter the Russians from starting anything. Therefore, in 1967, he froze the United States force of ICBM's at 1,000 Minutemen plus 54 of the older Titans. He also froze the number of missiles carried by our nuclear submarines at 656. Secretary McNamara had said a few years earlier: "There is no indication that the Soviets are seeking to develop a strategic nuclear force as large as our own." The Secretary was relaxed about the Soviet build-up; his feeling was that if the Soviets improved their capabilities for blowing us up, they could be more equal partners in the strategy of Mutual Assured Destruction, and the peace of the world would be more secure.

So, while the Russians were working away at increasing the size of their nuclear arsenal, the United States made no attempt to stay ahead of them, and the number of American missiles and nuclear submarines remained fixed at their 1967 levels. Meanwhile the Soviet military budget continued to climb. It went up steadily, 4 percent a year, year after year. At the same time, the American defense budget, exclusive of Vietnam, began to decline. In 1970, the two budgets crossed—one going up, and the other going down. Still the Soviet budget continued to increase, especially in the area of strategic forces—nuclear bombs, missiles, and submarines—where the Soviets spent about $40 billion a year, while American expenditures in this critical area of defense averaged about $12 billion a year.

By 1969 or 1970, the effects of the massive Soviet build-up were becoming apparent. In round numbers, the Soviet Union now had 1,400 ICBM's plus another 300 nuclear missiles in submarines. Meanwhile, the U.S. strategic forces remained frozen at their 1967 levels of 1,054 ICBM's and 656 nuclear-submarine missiles. Soviet superiority in ICBM's was roughly balanced by our edge in submarine-launched missiles. (We still had a fleet of aging B-52 bombers, but their usefulness against the massive Soviet air defenses was open to question.) Overall the Russians were about equal to us in nuclear destructive power.

Now both sides met the requirements for Mutual Assured Destruction. Each possessed enough weapons to inflict serious damage on the other fellow, and to American strategists, any further build-up by either nation would have been pointless. All that remained was to sit down with the Russians and formalize the arrangement with an arms-control treaty. SALT—the Strategic Arms Limitation Talks—was the result.

SALT, ratified in 1972, did not actually limit the number of nuclear bombs in the American and Russian arsenals. What it limited was objects that carry bombs, such as missile silos and nuclear submarines. A missile silo, as Senator Moynihan has pointed out, is a hole in the ground, and it can hurt you if you fall into it, but otherwise it is harmless. A true arms-control treaty should have limited the number and size of the nuclear weapons in the arsenals of the two countries. But the United States was never able to get the Soviet Union to agree to anything like that; the Russians would only accept a limit on items such as the number of holes in the ground.

Even so, the Russians found it difficult to live by the terms of the treaty after they signed it. Some years ago, for example, our satellites caught them in the act of digging 150 extra missile silos that were not permitted by the SALT treaty. When the United States brought this matter to the attention of the Russians, they explained that the new holes were launch-control silos, intended to house the crews and equipment which launched the missiles.

* A.A. Sidorenko, *The Offensive (A Soviet View)* (Moscow: Voyenizdat, 1970), trans. U.S. Air Force, Soviet Military Thought Series (Government Printing Office, 1974), p. 115; quoted in *The Future of Soviet Military Power*, edited by L.L. Whetten (Crane, Russak, 1976).

But the extra silos had special doors of the kind that pop open to permit a missile's quick escape. A silo with a pop-up door is essential for launching missiles, but highly undesirable for housing the launch-control crew, which usually is housed in an underground bunker to protect it from radiation and other effects of nuclear attack. Whatever use the additional silos might be put to initially, it was obvious that they were meant to be convertible to missile silos at a moment's notice.

Specialists monitoring Soviet compliance with the SALT treaty have reported many other violations. Some are ominous because they indicate a serious intent to deceive the United States. For example, former Secretary of Defense Melvin Laird reported in 1977 that the Soviets had gone to great lengths to conceal from our satellite cameras their operations with the SS-16, a new Soviet ICBM.

Unlike our strategic missiles, the SS-16 is mobile. American satellites discovered signs that SS-16's were being moved about under cover of darkness, concealed in wooded areas, and tested on ranges partly covered with camouflage netting. As a result, Secretary Laird said, we could not be sure whether the Russians were producing SS-16's merely in numbers sufficient to replace older missiles, as the 1972 SALT treaty allows, or enlarging their missile force illicitly beyond the number permitted by SALT. All we knew was that by "elaborate concealment" the Soviet Union had deliberately interfered with the means of verifying compliance with the SALT treaty, which was itself a flagrant violation of the treaty.

Secretary Laird also reported that when the Soviets were testing their SS-20 missile—the medium-range missile that has been deployed in large numbers in Russia and aimed against targets in Western Europe—they scrambled or coded the radio signals which are normally transmitted from the missile to the ground during a test flight so that missile experts can monitor the missile's performance. Because the signals were coded, United States experts could not decipher them to determine the characteristics of the SS-20's.

When the experts finally were able to break the code, they concluded that the SS-20 missiles had been tested with a ton of ballast aboard. This ballast, replaced by fuel, would increase the range of the SS-20 and enable it to attack targets in the United States. In effect the Soviet Union has constructed a dual-use missile that can be aimed either at Western Europe or the U.S., yet its numbers are not counted in the limit on Soviet ICBM's set by the SALT treaty.

The scrambling of the SS-20 radio signals was a particularly cynical violation of SALT on the part of the Soviet Union, because it struck at the very heart of the treaty—the promise by each side that it would not interfere with the other side's "national means of verification."

How did our government handle Soviet violations of the SALT treaty? Senator Edward Zorinsky brought that point up during Senate hearings on SALT II in 1979 when he asked Paul Nitze: "Do you know of any SALT violations that were not resolved . . . ?" Nitze replied: "No; but how were they resolved? They were resolved by [our side's] accepting what had been done in violation."

SALT treaty or no, the Soviet Union continued to outspend the United States by a wide margin on bombs and missiles throughout the 1970's. The United States budget for strategic forces—bombs, missiles, bombers, and submarines—went down under the Nixon, Ford, and Carter administrations, and reached a low point of about $9 billion in 1979, at which time it was three-tenths of 1 percent of our Gross National Product. Meanwhile, Russian spending on missiles and bombs continued at a level of about $40 billion a year. By that time, the Soviet Union had spent about $1 trillion on nuclear weapons.

These numbers belie the "action-reaction" theory of the arms race, which holds that the Soviet military build-up is always a response to increases in American defense spending. As Defense Secretary Brown said: "As our defense budgets have risen, the Soviets' have risen. As our defense budgets have gone down, the Soviets' have risen."

Now the time is 1983. The Russians have been outspending us on nuclear weapons since the 1960's. In President Reagan's administration the budget for strategic forces has risen, but not enough to make up for two decades of massive Soviet weapons construction. The Soviet Union is building 150 to 200 ICBM's a year, and we are building none. They are constructing several nuclear-missile submarines a year, and we have retired old submarines faster than we have added new ones, so that the number of submarine-launched missiles in the U.S. arsenal has actually declined.

The result is that the destructive power of the Soviet nuclear arsenal is now more than twice as great as that of the United States. The missile forces of the Soviet Union also have a combination of accuracy, destructive power, and numbers that will enable them to destroy most of our Minuteman missiles in their silos in a preemptive first strike. We lack any such capability. In other words, the Soviet Union has strategic superiority.

But does it matter? As Secretary of State Henry Kissinger once asked: "What in the name of God is strategic superiority? . . . What do you do with it?" The American strategic-nuclear arsenal, divided into the population of the world, is equivalent to a half ton of TNT per person. The Soviet strategic-nuclear arsenal is equivalent to two tons of TNT per person. Nothing seems to demonstrate the folly of building additional bombs and missiles more clearly than these numbers. By any

reasonable criterion, both the United States and the Soviet Union have acquired "overkill."

But the reasoning that leads to the idea of overkill, like the reasoning that leads to Mutual Assured Destruction, is based on an assumption. This assumption, again, has turned out to be false. The assumption is that the bombs of the Russians and of the Americans will be exploded over cities. This is what is meant by holding the civilian population hostage. The Russians, however, have made it plain that they find no merit in this idea. In their planning, the top-priority targets are not our cities but our missile silos, bombers, and submarines—and the communication links which would carry the orders for attack to their commanders. In other words, the Soviets aim to prevent us—in the event war should break out—from inflicting damage on their country.

How would the Soviet Union accomplish that objective? Civilian defense, air defense, and missile defense are part of the answer, and the Soviets have large programs in each of those areas. Civil defense is a fifth arm of the Soviet military, with status equal to that of the Soviet Strategic Rocket Forces, Air Force, Army, and Navy.

Another part of the answer is the 5,000 warheads on Soviet ICBM's. It is true that a small fraction of that huge arsenal could destroy every major city in the United States, but the warheads are not intended for that purpose; they are targeted against our 1,054 missile silos, probably two to a silo. This redundancy will insure nearly complete destruction of the American missile force, even when allowance is made for the fact that some Soviet missiles will not get off the ground, others will wander off course, and some will fail to explode.

Thus, the targeted American missile force accounts for approximately 2,000 of the 5,000 Soviet ICBM warheads. Another 500 warheads could be targeted on military airfields and whatever nuclear-missile submarines are in port or can be located. An additional 500 warheads could be allotted to the destruction of our military command-and-control centers and our military-communication links, with the aim of compromising the system by which instructions flow from the President and senior officials to military commanders in the field for the launch of a retaliatory strike on the Soviet Union.

This would leave a force of 2,000 ICBM warheads still available to the Soviet Union for use in deterring the United States from launching a retaliatory second strike with the ICBM's, bombers, or submarine missiles that had survived the first strike. If our government failed to see the wisdom of submission at this stage, and launched a retaliatory strike against Soviet cities, Russian reprisal would be swift and devastating, and the life of our nation would be ended.

What about our nuclear submarines? A great many Americans feel that submarines will be the ultimate deterrent to Soviet attack, regardless of the number of ICBM's in the Soviet arsenal. American Trident submarines are nearly invulnerable to detection when at sea, and, as President Carter once pointed out, the nuclear warheads carried on a single one of these would be sufficient to destroy all the largest cities in the Soviet Union.

The difficulty with this line of thinking is that missiles launched from submarines can only be used to attack cities and similar "soft" targets. The reason is that a submarine never knows precisely where it is in the ocean. Although the path of the submarine-launched missile may be very accurately guided during its flight, if the starting point of the missile's trajectory is uncertain, the place where it lands must be equally uncertain. As a consequence, the accuracy of submarine-launched missiles is relatively poor.

American submarines and their missiles therefore cannot be used to eliminate the missile force of the Soviet Union, or its command-and-control centers, because those targets, hardened with reinforced concrete and underground construction, can be destroyed only by the pinpoint accuracy of a direct hit. (An attack on cities does not require great accuracy, since the power of the nuclear weapon will destroy a city if the bomb explodes anywhere in the vicinity.)

These considerations indicate why American submarines cannot substitute for our force of Minutemen, as a deterrent to Soviet attack. From the limited accuracy of submarine-launched missiles it follows that these missiles can only be used against cities. Therefore they cannot be used at all, because our government will know that if used in this way, they will trigger a punishing Soviet counterattack on our own cities. What President would decide to launch our submarine missiles in an attack on Leningrad and Moscow, knowing that New York and Washington would be destroyed in return? Faced with this option, any government would prefer to live and fight another day.

In the course of time, technology will improve the accuracy of our submarine-launched nuclear missiles to the point where they will have a hard-target "kill" capability, and the American deterrent will be restored. According to present estimates, that should happen by the end of the 1980's. The intervening four to five years will be, as Dr. Kissinger has said, "a period of vulnerability such as we have not experienced since the early days of the Republic."

If the nuclear-freeze movement is successful, the period of vulnerability will be extended into the 1990's. Assuming that does not happen, how will the Russians make use of the four to five years of nuclear superiority they will still enjoy?

The Persian Gulf is the most likely target of a Soviet move. Imagine a Soviet-instigated outbreak of violence in Saudi Arabia, with American

businessmen taken hostage, and a pro-Soviet regime installed, backed by Russian guns and Cuban mercenaries. With a substantial part of the oil flow to Western Europe under Soviet control, and the Middle East in upheaval, the United States will be tempted to intervene with conventional forces. If the Soviets respond by sending in their own troops, and conventional war breaks out, we cannot prevail. The USSR has constructed five airfields in southern Afghanistan, bringing the Persian Gulf within range of its fighter aircraft. The Soviet navy heavily outnumbers the American navy in surface ships and attack submarines. As a consequence, we will probably not be able to maintain our supply lines to the Gulf and the Mediterranean and simultaneously protect our sea lanes in Atlantic and Asian waters. Defeat will be almost certain.

Could we threaten to escalate to the nuclear level? Only this threat could hope to save us from defeat in the Persian Gulf. But now the Soviet superiority in nuclear weapons becomes the decisive factor. The United States has gone on a nuclear alert three times in the past—in 1948 in the Berlin crisis, in 1962 in the Cuban missile crisis, and in 1973 when the Russians threatened to intervene in the war between Egypt and Israel. We prevailed in each confrontation. In the first two cases we had strategic superiority, and in the third a rough parity. Today, this is no longer true. We would not dare to threaten the use of our nuclear weapons, because of the circumstances I have described.

What about a Soviet move into Western Europe? In Europe, the superiority of conventional Soviet forces would be overwhelming: approximately 45,000 tanks on the Soviet side against 17,000 in NATO; a Soviet superiority of 2 to 1 in aircraft, 2 to 1 in artillery, and 3 to 1 in missile launchers. NATO forces would not be able to withstand a massive Soviet thrust into Western Europe.

But a direct attack would not be necessary. Threats, accompanied by a general escalation of tension, would probably suffice to bring all of Western Europe under Soviet hegemony. Aleksandr Solzhenitsyn has described how it would happen:

> At one time there was no comparison between the strength of the USSR and yours. Then it became equal. . . . Perhaps today it is just greater than balance, but soon it will be two to one. Then three to one. Finally it will be five to one. . . . With such a nuclear superiority it will be possible to block the use of your weapons, and on some unlucky morning they will declare: "Attention. We're marching our troops to Europe, and if you make a move, we will annihilate you." And this ratio of three to one, of five to one, will have its effect: you will not make a move.

Twenty years ago, or even ten years ago, the American nuclear arsenal would have been sufficient to deter a Soviet attack on Western Europe, but that is no longer the case.

When will the Russians make their move? Leonid Brezhnev supplied the timetable a few years ago, in a speech to Communist leaders in Prague:

> We are achieving with détente what our predecessors have been unable to achieve using the fist. . . . By 1985, . . . we will have achieved most of our objectives in Western Europe. . . . Come 1985, we will be able to extend our will wherever we need to. . . .

And so we finally see why strategic superiority matters. We see how it is that, as Senator Moynihan has said, he who can blow the world up three times has more power than he who can blow it up only twice.

March 10, 1986

# THINKING ABOUT SDI

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# CURRENT NEWS
## SPECIAL EDITION

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International Security SUMMER 1985


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# Rhetoric and Realities in the Star Wars Debate


*James R. Schlesinger*


During the mid-1960s when I was at Rand, the initial deployment of the Soviet ABM system caused a good deal of concern. The perplexing question of how to assure penetration of that system was argued and re-argued. The final judgment—the canonical solution of Secretary McNamara—was that the United States would counter the Soviet ABM by greatly expanding the number of warheads that we could throw against the Soviet Union. Indeed, by the time I left Rand, we were already talking about some 50,000 warheads to overcome Soviet defenses. In other words, we were going to expand our offensive capabilities geometrically to deal with Soviet defense. That was the initial American reaction to the problem of ballistic missile defense. Therein also, more than coincidentally, lay the birth of the MIRV. The way we were going to add large numbers of warheads was to fractionate the payload of our missiles. Several years later we proceeded to do precisely that—for entirely different and perhaps more dubious reasons. In all this there is a moral to be learned, which I shall attempt to develop later on.

In the late 1960s Secretary McNamara was informed by his President, Lyndon Johnson, that contrary to the Secretary's own advice the United States was going ahead with its own ABM system—then known as the Sentinel. The Sentinel would provide a thin-area defense designed to stop a limited number of warheads coming into the United States. It was, I think you will all recall, the period when the Red Chinese (more recently known as the People's Republic of China) were supposedly on the march under the malevolent guidance of Lin Piao. Supposedly the Chinese were preparing to encircle the cities from the rural areas, which we interpreted to mean they were going to destroy the industrial nations through guerilla warfare—as in Vietnam. A good deal of apprehension was expressed at the time by Secretary Rusk and by the President about the Chinese threat. What would happen when this billion people were armed with nuclear weapons? That small

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This paper was presented as a speech at the National Security Issues Symposium at the MITRE Corporation on October 25, 1984, and appears in the Symposium Proceedings.


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*James Schlesinger was U.S. Secretary of Defense 1973–75 and Secretary of the Department of Energy 1977–79. He is presently Counselor at the Center for Strategic and International Studies at Georgetown University.*


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**Daniel Friedman, Editor**

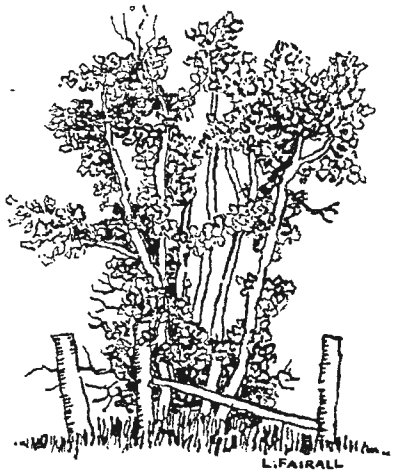
**Harry Zubkoff, Chief, News Clipping & Analysis Service (SAF/AA), 695-2884**

# THE DIPLOMATIC ROUND

## TEST

"Obsessive" is a fair description of the state of mind into which the Star Wars project—President Reagan's plan for taming the nuclear genie—has maneuvered European governments. Reagan's commitment to his strategic defense initiative, or S.D.I., as diplomats and soldiers call it, is reliably said to be total and unshakable; the project is meant to be his enduring legacy to the cause of keeping the planet Earth in one piece. But other governments, along with most people in official Washington, strongly doubt whether the plan is feasible; nor will it be, they say, for as far into the future as most imaginations can stretch. Also, every European capital is deeply apprehensive about the near-term consequences of the initiative, which is known to be very much Reagan's own. In mid-May, just after the economic summit meeting in Bonn, I visited Bonn, Paris, and London to find out what people were thinking and saying about Star Wars and how they were responding to heavy American pressure to endorse the project and take on a part of the immense research, much of it recondite, that underlies the largest spending program this or any other country has ever proposed. In all three capitals, people seemed to be talking of little else; Star Wars has become a consuming topic. Even though the press coverage of the summit meeting dwelt largely on Reagan's visit to the Bitburg cemetery, Star Wars, I learned, was really the dominant, if generally offstage, topic of the conference. In Bonn, some of my appointments were postponed because emergency meetings on Star Wars popped up. One official cancelled an appointment because he was abruptly hauled off to Washington for an unexpected meeting on the subject. The issue has pushed the Germans into what is for them the most uncomfortable of positions—having to choose between America, their protector, and France, an old enemy but now the other half of a partnership that anchors Europe's political and economic stability. The contesting pressures from Paris, which is openly hostile to Star Wars, and Washington are heavy, and may become intolerable; a choice between the two places isn't one the Germans can make. They need both. A European ambassador based in Bonn says, in describing the effects of Star Wars, "The Foreign Ministry is *Ratlosigkeit*"—a condition somewhere between stumped and bewildered.

In Paris, the government of President François Mitterrand has been maneuvered or tempted—or in part both—into playing *cavalier seul*, a role that General Charles de Gaulle exalted in the nineteen-sixties. In matters affecting French security, de Gaulle incarnated France's strong preference for free hands and self-sufficiency. "However large may be the glass offered to us, we prefer to drink from our own, while touching glasses round about," he said. Actually, most French, British, and German officials and diplomats are roughly in agreement about Star Wars. But each of their leaders is dealing with the problem largely in terms of political self-interest—hence differently from each of the others. Mitterrand wants to cut the losses he is expected to suffer in parliamentary elections next year, and he reckons that he can gain politically by saying what he and his people think about Star Wars; he is probably right. His colleagues in Bonn and London, Chancellor Helmut Kohl and Prime Minister Margaret Thatcher, confront a more complicated situation. Kohl's is especially difficult; like Mrs. Thatcher, he wants to avoid getting into a row with Washington over Star Wars, or even getting very far afield from its eminent patron. Kohl's political stock is falling. A member of his government, Interior Minister Friedrich Zimmermann, has openly criticized him for lack of leadership. And on Sunday, May 12th, Kohl personally and his Christian Democratic Party experienced an unexpected and shattering political defeat in North Rhine–Westphalia, where about a third of the electorate lives. Although Star Wars wasn't an issue, German diplomats worry that it will become one—perhaps the pivotal issue in federal elections to be held in April of 1987. The Social Democratic Party is unalterably opposed to it, and some of Kohl's political advisers are already envisioning a campaign in which Germans will be asked whether they are for or against America and the Atlantic alliance, with Star Wars becoming the test of continued German support for both. German officials and diplomats, most of whom are as appalled by Star Wars as the French, also worry that their Chancellor, because of his heavy-handed insistence that Reagan go through with the ceremony at Bitburg, is deeply indebted to him and will be asked to make good with open support of Star Wars. After Bitburg, Kohl was apparently overheard to say, "Ron, I will personally never forget what you did." The Administration isn't letting him forget. Stories about Kohl's having damaged his standing with the White House began to appear just after the summit. "Reagan's trust and confidence in Kohl have been impaired, perhaps permanently, by the controversial wreath-laying ceremony," a story in the Washington *Post* said. And the French government has used the press almost unceasingly to register its unhappiness with Kohl's summit performance—especially his quite unexpected expression of support for Star Wars, which seemed to undercut Mitterrand's efforts to rally support behind a European alternative. The French campaign appears to be working. "We are hearing tones out of France that we have not heard in a long time," a German official told the *Times*.




Although Margaret Thatcher shares the concerns of her ministers and civil servants about Star Wars, there is her somewhat special relationship with Reagan to be protected; and it is said that, being a scientist (a

# FEATURES/COLUMNISTS

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MONDAY: RACE FOR THE HIGH GROUND
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## STAR WARS
## WILL IT WORK?
## 6

# The politics of space

By Peter Grier

In the US Capitol, a roomful of conservatives is cheering for missile defense, over dessert. "I'm for an arms race — in defensive systems!" cries activist Phyllis Schlafly. A block away, at 100 Maryland Avenue, liberal lobbyists meet every Thursday and plot against President Reagan's ballistic-missile defense initiative. "It's so big, we can't stop it. But we have to slow it down," says a participant in the meetings.

In Washington, a political fight is heating up over the President's proposed nuclear-missile shield.

The immediate battles will be over money for the Strategic Defense Initiative (SDI), popularly known as "star wars." But both sides know something far more fundamental is at stake: whether the US will reverse its nuclear strategy of the last 20 years and erect any sort of missile defense.

SDI, after all, is an ambitious package, involving billions of dollars for research on lasers, high-speed electric cannons, and other exotic weapons. Its stated goal is to see if an effective shield that eventually makes nuclear weapons unusable is possible.

Congress could reject SDI totally, embrace it, or simply redirect the program's broad approach. Members of Congress might vote to protect US intercontinental missile bases, for instance, with rings of rocket interceptors. They could decide to defend a mixture of some missile bases and cities.

"There may be something there," muses Rep. Les Aspin (D) of Wisconsin, influential chairman of the House Armed Services Committee.

The conservatives crammed into a Capitol room last September represent one pole of this debate.

They had gathered for a meeting of the Coalition for the Strategic Defense Initiative, a lobbying group whose members include the Moral Majority and Citizens for Reagan.

A series of speakers thumped home the message that America needs a shield against Soviet missiles — a broad effective shield, not just a demure little defense around Minuteman missile bases. Besides Phyllis Schlafly, longtime spokeswoman for conservative causes, hosts included Rep. Jack Kemp (R) of New York ("Whenever anyone asks, I say I'm a dove — a heavily armed dove") and Sen. Malcolm Wallop (R) of Wyoming, a laser-weapons champion who complained that the Pentagon is not pursuing missile defense with sufficient skill.

Underlying all the speeches, punctuated with the constant clatter of silverware, was the theme that the Soviets cannot be trusted, that defense and not arms treaties is the way to true security. Thus the coalition's purpose is to "raise public awareness" in support of SDI and perhaps to save SDI from itself.

The liberal lobbyists and their weekly huddle show the other pole of the strategic-defense argument. Thursdays at 1:00 p.m., representatives from the Union of Concerned Scientists, the Council for a Livable World, and other self-styled peace groups meet to coordinate their anti-SDI tactics. This ad-hoc committee has dubbed itself the Space Policy Working Group.

For the most part its members believe that new weapons systems are dangerous because they goad the Soviets into building new systems of their own, leaving both nations in the same strategic situation, but poorer. They feel arms control agreements, not new technology, represent real protection.

Missile defense "is not going to end the arms race," says Union of Concerned Scientists lobbyist Charles Monfort. "You'd still spend billions on countermeasures, and counter-countermeasures."

## Congress caught in the middle

Caught between these opposing camps, but so far paying little attention to either, is Congress. Though legislators have sawed the occasional hunk out of SDI's budget, they have done nothing to change the fundamental thrust of the program.

The SDI, after all, is just the sort of thing that Congress has trouble understanding. It's big and it's highly technical. The Capitol is swarming with lawyers, not physicists.

"Congress's knowledge of technology? It's abysmally poor," says Sen. John Glenn (D) of Ohio.

Senator Glenn, a former astronaut, says colleagues often ask his opinion of SDI. After several grand tours of US missile defense labs, Glenn says the experiments are impressive, but he's not sure when or if a working system could be built. "This program is mind-boggling," he says.

Another reason Congress has yet to focus fully on SDI is that it has been fixated on another strategic-weapons acronymn: MX.

The MX missile was first proposed by the Pentagon more than a decade ago. Larger and more accurate than the venerable Minuteman, the MX was supposed to strengthen US land-based nuclear forces.

But Congress and the Pentagon kept

STAR WARS...Pg. 2-F

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ness as much as it should have. For all of his hawkishness, Jackson didn't show much interest in whether or not all the weapons he wanted to buy really worked.

Some old friends believe that had Jackson lived longer, he would have found himself alongside Barry Goldwater questioning the Pentagon for the first time in his life. "I detected no enthusiasm on his part for the way things were moving. None. He didn't think they [Reaganites] were very subtle or well informed," says Moynihan, who notes that he ran for the Senate in 1976 in part as a way of continuing the Jackson campaign. John Lindsay, a *Newsweek* correspondent who covered Jackson for years, says that today's mythology is misleading. "I'm not sure Scoop Jackson would have been, quote, 'Scoop Jackson.' He was for a strong defense, all right, but not for spraying the world with weaponry." Who can know for sure? Jackson's real legacy may well take the full 15 years to probate. In the meantime, the Democratic effort to find new approaches is deemed heretical by avatars of the old thinking. Scoop as plaster saint keeps getting in the way.

Why Star Wars may be a higher form of Mutual Assured Destruction.

# MADDER THAN MAD

## BY LEON WIESELTIER

AMONG THE Reagan administration's many contributions to the history of American illusion, historians will record its successful attempt to persuade the American public (and a large part of the American political class) that the Strategic Defense Initiative marked a departure from some previous American hospitality toward nuclear war. That hospitality, according to the official account of the nuclear age, was called Mutual Assured Destruction, or MAD. Until March 23, 1983, when Ronald Reagan announced the attempt to make nuclear weapons "impotent and obsolete" by means of defenses against them, the policy of the United States was to prevent a nuclear war by promising to destroy the society of the Soviet Union. And, the *faux-naïf* account continues, from this sinister situation Reaganism recoiled in horror.

MAD is morally intolerable and strategically senseless, the administration concluded. And so it proposed its extravagant and epochal revision. Not the offense, but the defense, shall deter war. Although nobody, except possibly the president, believes in the possibility of perfectly protecting the men, women, and children of this country from the nuclear warheads of its enemy, the faith in some form of significant protection of earth from space, of protection significant enough to free us from the curse of Mutual Assured Destruction, remains strong.

The administration flatters itself. The horror of nuclear war is as old as the nuclear age itself, though the prominence of that feeling in the policies and politics of Ronald Reagan is a novelty. And almost all of the administration's ideas for transcending what used to be called the balance of terror are just as old. As soon as the full, foul lethality of nuclear weapons was appreciated, the attempt to limit it was launched. The administration is distorting the past. Except for a few of McNamara's months at the Pentagon, MAD was never the operational policy of the United States. MAD is not a name for a strategy; it is a name for a reality.

Intellectually, the attempt to relieve the United States of MAD took two forms. There was the idea of precision and the idea of invulnerability. By the 1960s both of these ideas were maturely developed; the Reagan revisionism in nuclear strategy is battening off a rich inheritance of impatience with MAD, even as it pretends to have invented the impatience. The problem for the earlier generation, however, was a lag between strategy and technology. The concepts for something less than a Soviet-American suicide pact existed long before the devices required for it. But the scientists are now catching up with the strategists; Reagan is merely presiding over the moment. Both the idea of precision and the idea of invulnerability seem suddenly within the reach of technology. Not enough within its reach to free us from the nuclear fact of our life—as long as we know how to make these weapons, we will live by our nerves—but enough to encourage some very noble nonsense.

The idea of precision has gone by many names in the swiftly changing semantics of nuclear strategy: "counterforce," "flexibility," "damage limitation," "selectivity," "discrimination," and so on. Essentially it means making nuclear war more like conventional war, first by withholding American strikes from cities and other population centers, second by increasing the accuracy of nuclear weapons and decreasing their power of destruction. (That power is known, in a fine nuclear Orwellianism, as their "yield.") The promise of precision is of something less than total destruction, though in practice the difference between a large "counterforce" attack and MAD may be meaningless.

The idea of invulnerability is not about offense, but defense. In its weak version, it proposes to thwart a Soviet strike against American military targets by protecting them. Such protection may include everything from the physical hardening of missile silos and command centers to the more flamboyant directed-energy weapons in space that the administration so ardently admires. In its strong version, it proposes to protect all or most of the American population, again by means of extraordinary space-based technology. The promise of invulnerability, like the promise of precision, is of something less than total destruction; and in its utterly fantastic formulation, which is usually the president's, it is a promise of no destruction at all.

The idea of precision is incarnated most popularly in the MX missile, and more perfectly in the Midgetman missile, and more perfectly still in the D-5 missile (launched from submarines, which are almost impossible for an attacker to find), and most perfectly in the cruise missile. The idea of invulnerability is supremely incarnated in SDI. Although the precise "architecture" of SDI is hard to pin down, all its configurations appear to involve the deployment of offensive and defensive instruments of warfare in space.

The Reagan administration is passionately committed to both of these systems, to the "modernization" of the ICBM force by means of the MX and to the defense of American military and civilian sites from space. (Its commitment to the Midgetman is lamentably less firm, for reasons that have to do with Star Wars.) What seems not to have occurred to our planners, however, is that these commitments may grossly contradict each other. In fact, when you consider carefully the strategic environment that would result from SDI, you are led to conclude that SDI is directly opposed to the logic of precision and to the logic of invulnerability. In truth, the Reagan administration's achievement may be the perfection of MAD in the name of transcending MAD. SDI as the best thing that ever happened to MAD: the irony would be delicious if it weren't so dangerous.

## II.

THE MOST RIGOROUS employment of the principle of precision against MAD has been made by Albert Wohlstetter. He argues that there has been a "revolution in precision" so great that we may now develop nuclear weapons that need not be characterized as weapons of mass destruction. There are two ways, Wohlstetter observes, to improve the effectiveness of our nuclear arsenal: "When one improves effectiveness by releasing more destructive energy, there is a corresponding increase in collateral damage. When one improves the ability to destroy a target by increasing one's accuracy, there is a corresponding decrease in collateral damage."

For reasons of morality (who can support "the slaughter of innocents"?) and of strategy (who can rely upon "the rhetoric of indiscriminate threats"?), Wohlstetter rightly argues for accuracy:

> Improvements in guidance using midcourse adjustments have already reduced cruise-missile accuracies to 200 feet from the 12,000-30,000-feet average misses expected for ballistic missiles in the late 1950s. That improvement by a factor of 60 to 150 makes feasible radical reductions in collateral damage. Even more important, terminal guidance systems in development now [1983] that could be deployed in the late 1980s could further reduce inaccuracies at extended ranges by another order of magnitude.

Here, in the technology of terminal guidance, lies the new opportunity for the old strategy of overcoming MAD through "counterforce," of aiming weapons at other weapons rather than at people. Of course, the threat of mutual assured destruction isn't quite overcome, even by bullet-like accuracy. First, accuracy isn't the same as reliability; there can be no certainty about the actual behavior of missiles in an attack, and a large calamity may result from a small malfunction. (The "collateral damage" of the American raid against Tripoli a few weeks ago resulted from the straying of state-of-the-art missiles that were confused by clouds.) Second, many Soviet military targets are located in or near Soviet population centers; the Soviets may be forgiven for mistaking an attack on their cities in the name of "counterforce" for an attack on their cities, period. Third, the danger of "escalation" to a catastrophic level of conflict remains after a "discriminate" attack. The most that precision can provide is the possibility that World War III will not begin with the end. Fourth, making nuclear weapons less destructive may make them less inhibiting to use. What strategists think of as "low yield" is quite high enough to qualify for a nightmare.

Fifth, and finally, the ability to strike more precisely amounts also to the ability to strike first. The assurance that one's society may not be destroyed during a war is a little vitiated by the anxiety that one's forces may be destroyed at the beginning of a war. Hence the famous American fear of a Soviet first strike, which profited Ronald Reagan so handsomely in 1980. The "accuracy race" seems to have been run; the Soviets, too, can strike more "discriminately" against our own military installations.

STILL, IF PRECISION will put off the apocalypse, by leaving both sides with something to lose, and therefore with a reason for concluding the war, it will have done a lot. It may also firm up deterrence, by making the threat of retaliation "credible" (they may not be deterred by our threat to kill ourselves too) and less immoral (we may not be guilty of genocide, if deterrence fails). Thus Secretary of Defense Caspar Weinberger boasts, in the current *Foreign Affairs*, that "our Administration has accelerated the development of more selective, discriminate, and controlled responses. . . . We have already rendered obsolete one of the concepts of the MAD logic: the belief that deterrence must rest on the threat to destroy a certain high percentage of the Soviet population. . . . Indeed, we

believe that such a doctrine would be neither moral nor prudent."

But there is a premise to precision of which the administration appears to have taken no notice. It is: open skies. For counterforce to work, morally and strategically, American planners must assume the absence of Soviet interference with a "discriminate" attack. American missiles must be able to reach their smaller and more specific targets; and the Soviets must be able to discern that we have made a smaller and more specific strike. In a world of strategic defenses, however, offensive precision will be impossible. Interference with attacks will be the rule.

THE ADMINISTRATION is agitating for a strategic environment in which its very accurate ICBMs can be intercepted at any point in their terrible trajectory, from "boost phase" to "midcourse" to "terminal phase," over the territory of the attacker, in space, and over the territory of the attacked. Systems of the sort envisaged by SDI will make open skies a thing of the past. What can you do with your ICBMs when you are confronted by an adversary with a "layered" defense? You can do one thing, and one thing only: you can barrage. You can rain your ICBMs down upon your adversary's head and hope that some of them get through, and maybe even land where you wanted them to land. *And that is MAD.*

It is incoherent, in short, to insist upon both the MX and SDI. The latter will have the consequence of removing the former's reason for being. But countermeasures, the administration will say. There will be countermeasures, which will make it possible to thwart a significant portion of the adversary's defenses. To be sure. But will the countermeasures suffice, not only to "punch a hole" in their defenses, but also to restore the certainty of our counterforce-targeting policy? For certainty is what such a policy requires. American missiles must not merely survive and straggle out of Soviet defenses; they must also strike exactly where they have been instructed to strike. If they strike anywhere else, if they hit not the airfield but the town near the airfield, not the silos but the schools, they will have committed . . . mutual assured destruction. They will have slaughtered the other's innocents and invited the other to slaughter our own. All that countermeasures can accomplish, all that defenses can accomplish, is the transformation of a smart attack into a dumb attack, of a missile that left the atmosphere over the United States as a "silo buster" of the 1980s into a missile that enters the atmosphere over the Soviet Union as a "city buster" of the 1960s.

There is an assumption, however, according to which the simultaneous embrace of the MX and SDI, of the logic of precision and the logic of defense, makes sense. It is the assumption that only the United States will have both. This is an assumption that is commonly made in Washington. Planners and pundits cheerfully discuss the matter of SDI as if our defense of ourselves is all that is under discussion. At least the president understood correctly, in his Star Wars speech, that the SDI vision must include a defended Soviet Union, too. It may be, of course, that American defensive technology will be finer than Soviet defensive technology, at least in the early years of the mutually defended world. Still, history shows that the Soviets generally catch up with alarming alacrity. In fact, their totalitarianism may even make up for their technology. It is not hard to imagine a general-secretary of the Soviet Union proceeding with the furious development and deployment of a defense of his people and his weapons on earth and in space, while a president of the United States pleads with Congress for a little "point defense."

Nor is that all. The MAD of a defended world will be more dire than the MAD of a defenseless world. In a defenseless world, there are more intelligent and less intelligent, more destructive and less destructive, ways to design a nuclear attack. Though all of them be bitter, we have "options." A nuclear war may not even destroy the world. In a defended world, however, no attack can be designed. It can merely be made, with prayers. Mutual assured destruction will be *all* that is possible.

## III.

THE ABSURDITY OF MAD, according to its critics, lies in the proposition that there is safety in vulnerability. MAD seems to suggest (particularly in its classic text, the ABM Treaty) that in the nuclear age there is greater risk in protecting what you value than in exposing it. This turns ancient strategic wisdom, as well as common sense, on its head. And so the architects of a post-MAD world are committed to the idea of invulnerability, either of our weapons or our people or both.

The vulnerability of American forces to a Soviet strike is an old worry. Sometimes the worry was proper, as in the case of the famous RAND study of the vulnerability of American air bases in the early 1950s. Sometimes it was spurious, as in the case of the "missile gap" that helped elect John F. Kennedy. Most recently the worry has taken the form of a window—the "window of vulnerability" that helped elect Ronald Reagan. In this season of swagger it is hard to recall the alarmism of the first Reagan term, when the highest officials in the land behaved as if it were only a matter of time before the Russians "took out" our land-based ICBM force in a perfectly executed first strike and it was red dawn in America.

The Scowcroft Commission of 1983 retired the alarmist analysis by pointing out that the vulnerability of the ICBM could be corrected by making it mobile, and therefore harder for the Soviets to find. The commission urged, moreover, that we also make the Soviets less keen to find it, by reducing the number of warheads on the mobile missile to one, and thereby making it a less attractive target. The Midgetman, as the mobile single-warhead missile came to be called, remains the soundest way to secure and to stabilize our land-based strategic force. Finally, the commission soberly observed that the fear of the first strike was really a way of sowing panic in the population—that despite the vulnerability of the ICBM, "to deter such

surprise attacks we can reasonably rely both on our other strategic forces and on the range of operational uncertainties that the Soviets would have to consider in planning such aggression."

THE SCOWCROFT Commission also acceded to the administration's demand for the MX. It recommended, in stunning contradiction to itself, that 100 MXs be deployed in the very Minuteman silos whose fixity was precisely the reason for the ICBM's vulnerability. At the time there were those who denounced the report as a cynical exercise in politics, as an intellectually fancified means of giving the president what he wanted. The administration's policies since Scowcroft give credence to the criticism. Its lukewarm attitude toward the Midgetman is a scandal of national security. Officials who proudly proclaim their support for Star Wars look you straight in the face and say that Midgetman is too expensive. Assistant Secretary of Defense Richard Perle, who has made a career out of his concern about ICBM vulnerability, told the London School of Economics last February that the $1.4 billion appropriation for Midgetman in 1987 (an appropriation that was spared the Gramm-Rudman guillotine by a last-minute act of clemency) would be better spent on SDI. Suddenly it doesn't seem to matter that Midgetman would finally close the window.

The truth is that there are certain supporters of SDI who want to keep the window open. The competition between Midgetman and SDI is not merely for money. It is also for the proven political prestige of the fear of the first strike. This fear is being fanned back into life by those who cannot bring themselves to accept the president's fantasy of a perfect shield, but also cannot bring themselves to be banished from the charmed circle of SDI. Zbigniew Brzezinski is the best example. He has suavely argued, in these pages and elsewhere, that SDI is necessary to frustrate a Soviet first strike. He says it "would render the Soviets' new generation of accurate missiles useless." (No mention of the fact that their defenses will render our new generation of accurate missiles useless, too.) This is ridiculous. The United States can disrupt a Soviet first strike, and therefore sufficiently complicate Soviet planning for it, by means much more modest than the pharaonic programs of SDI. We can make our missiles mobile, we can build "point defenses" around them, we can deploy other kinds of traditional ABM systems, and so on. For the purpose of protecting our forces, there is no need to go into space.

The SDI thesis, however, is that we must find solutions in space for problems on earth. In the name of invulnerability (of weapons, in the Brzezinski version, of citizens, in the Reagan version) we will station weapons in space, and increase our dependence upon satellites in space by many orders of magnitude. While there already exist familiar ABM technologies for the interception of missiles from below (the Galosh system around Moscow, for example), the innovation of SDI, the technological thrill of it, is the interception from above. An attack against a missile in "boost phase," that is, on its way up, and in "midcourse," can be accomplished solely from space, since we cannot "see" the launch and early flight of Soviet missiles from American soil.

Such interceptions will require certainly hundreds, and probably thousands, of satellites. For a satellite is in position to attack a missile for only a fraction of its orbit. A small fleet cannot keep the Soviet Union covered at all times. Richard Garwin and Hans Bethe have estimated that it would take "1344 satellites of 0.5 retarget time in optimum orbit . . . working perfectly reliably" to defeat a significant Soviet attack—and that is "perfectly reliably." (Brzezinski claims that all SDI's missions require is 100 satellites, which amounts to a sort of "minimum deterrence" in space. Brzezinski's number assumes that the tin will work without a hitch, and also that the Soviets will not modernize or multiply their forces.)

The problem with such a decisive dependence upon satellites is that they are paltry things, perhaps the most perfect targets in nuclear history. Their orbits are fixed. The ways of attacking them (ASAT) are many. They can be attacked from below, by the Galosh interceptor or something like it; by nonnuclear interceptors launched from fighter jets (the United States tested such a "miniature homing vehicle" a few years ago); by ground-based laser weapons, which particularly worry the Pentagon's annual report on Soviet military power; by space mines, which are small, cheap, and easily proliferated; even by steel pellets, dumb but deadly for the mirrors in space that a directed-energy defense will require.

Moreover, from the standpoint of satellite survivability, SDI is divided against itself. There is a fateful overlap between the technology of antimissile defense and the technology of antisatellite offense. Most systems built to destroy missiles can be used (more easily, even) to destroy satellites. What's more, you don't have to destroy a satellite to prevent it from functioning; its supremely sensitive optics and electronics could be ruined by the thermal and electrical shocks produced by explosions far away.

IT IS INTERESTING, then, to compare the vulnerabilities of the great sitting ducks of our day: the ICBM in a fixed silo and the satellite in a fixed orbit. The comparison is warranted by the claims of the administration and its apologists that ICBMs on earth can be saved by satellites in space. The results of the comparison are interesting.

* A missile is on sovereign soil and a satellite is not. To attack a missile in its silo, therefore, is to start a war. To attack a satellite in its orbit is to start something less, though very grave.

* You cannot harass a missile in its silo, but you can sidle up to a satellite in its orbit and travel alongside it, for the purpose of inspecting it or irritating its proprietors. (For this reason it has been suggested that the United States and the Soviet Union must negotiate "keep-out zones." It is hard to understand why people who believe that the Russians will not honor the rules of the road on earth believe

that they will honor them in space. Anyway, there is no "keep-out zone" like your own territory.)

* A missile may be "modernized," but a satellite is forever trapped in the era of technology in which it was launched. You cannot call it back and improve it. You can only launch a new one, presumably with "counter-countermeasures" that increase its survivability.

* A fixed missile may be made mobile. A fixed satellite already is mobile. In space, mobility in orbit is a form of fixity.

* Satellites are ambiguous in a way that missiles are not. As Ashton B. Carter has written, "satellites [that] do not carry weapons and do not shoot anything . . . can directly support military operations." And the "benign" satellites are just as vulnerable as the "threatening" ones. Thus the chances of crisis in space, the occasions for fear and uncertainty, exceed those on earth.

There is also a larger historical consideration. Whereas the United States and the Soviet Union are equally dependent upon ICBMs, for deterrence and for the hell after deterrence, the United States is more dependent than the Soviet Union upon satellites. The reason is not simply SDI, though that will certainly deepen the dependence. It is, rather, that the military and political commitments of the United States are geographically more dispersed than those of the Soviet Union, which enjoys the proximity or the contiguity of most (and maybe all) of its vital interests. We need higher and better eyes and ears than they do. Moreover, intelligence about a closed society is much harder to obtain than intelligence about an open society. We also need more eyes and ears than they do. We are more threatened, in short, by ASAT.

IN EXCHANGING the vulnerabilities of missiles for the vulnerabilities of satellites, then, we may be exchanging a rattling nuclear regime for a more rattling one. Still, a number of objections may be offered. First, it may be argued that satellites in high orbit are much less vulnerable than satellites in low orbit, and maybe even invulnerable. True, but almost all of SDI's missions require satellites in low orbit, between 200 to 1,000 kilometers high, well within the reach of ASAT weapons. Next, it may be argued (though it will be a strange argument to hear from the Reagan administration) that arms control for ASAT is the answer. But arms control cannot be the answer, not merely because ASAT weapons can be developed and deployed covertly, but also because ICBMs themselves may act as ASAT weapons; and we know how well arms control has controlled *them*.

Finally, it may be argued that there are indeed "counter-countermeasures," ways of protecting satellites against attack. And there are. A recent report by the much-maligned Union of Concerned Scientists lists five: "ablatives [hardening of the satellite surface against lasers], maneuvering, concealment, redundancy, and shooting back." But hardening will not protect the exposed components of the satellites, such as their mirrors and sensors, and it will make the satellites almost impossibly heavy, and it can be matched by more powerful space mines; maneuvering will not work as swiftly as the speed-of-light weapons directed against the satellites, and space mines can follow the maneuver; concealment will probably not work for all of the system, and the offense need find only a few satellites to disrupt the whole defense, and anyway, satellites are very large and their orbits are very predictable; redundancy will cost, well, the earth, and weapons to attack the redundant satellites are much cheaper than the satellites themselves (which, of course, is a fundamental flaw with the whole idea of SDI); and shooting back will not work against "single-shot weapons," such as X-ray lasers, and it is unlikely that a satellite will be able to defend itself against attack *and* attack the ICBMs that it was put in space to attack.

This is not to say that we will never be able to make satellites survivable. It is to say only that we cannot make them survivable now, or in the near future. In the debate about defenses, therefore, the burden of proof is not on ASAT, or on the ability to attack satellites. We have such an ability, and so do they. The burden of proof is on DSAT, or on the ability to defend satellites. Until the administration can demonstrate that it can deal with the danger in space, it should not pretend to have reduced the danger on earth. It has merely moved the mutual hostage relationship to the heavens.

ONE OF THE oddest delinquencies of this administration has been its failure to worry about imperiled satellites with anything like the intensity with which it worried about imperiled missiles. "Despite continuing concern at the vulnerability of U.S. space assets," writes Paul Stares in his splendidly written and scrupulously researched book *The Militarization of Space: U.S. Policy, 1945-1984*, "the level of effort to improve satellite survivability remained low relative to the value of the satellites." When I called the Office of the Strategic Defense Initiative last month, I was assured that satellite survivability is one of "General Abe's" [Lt. Gen. James Abrahamson, the director of SDI] highest priorities: "If not number one, then number two or three." I was referred to the Pentagon's annual report for satisfaction. There I found something called "SLKT," or "survivability, lethality, and key technologies." It is fifth of the five "program elements" of SDI, it is given nine little lines, and all that it offers the anxious reader is this sterling sentence: "These issues must be resolved before any future decisions with respect to possible development and deployment may be addressed."

Ronald Reagan is not transcending MAD. He is celestializing it. Before the celestialization of MAD costs the American public any more trust or treasure, the administration should be made to answer to its own cherished criterion for strategic systems, which is the criterion of survivability. Giving the offense the advantage in space is no way to rob the offense of the advantage on earth. Forget the window of vulnerability. Ronald Reagan is giving us the skylight of vulnerability. □

JMP May 28,1986

The following are a list of possible questions/issues to be raised with the official from SDIO during our meeting on Thursday, May 29. The questions are directed at developing responses to recent efforts by anti-SDI activists as well as the "broad-based" Senate coalition opposed to the President's requests for increased funding for SDI. The questions are also designed to prepare a new approach for the President regarding SDI - an approach that will assist the President in winning over public opinion, improving the image of the missile defense program in the media, and defeating the claims of the anti-SDI activists.

The questions are divided into three categories: Technical, Political and Technical-Political (or Strategic).

Technical questions: (Some of them overlap)

1) What are the "new breakthroughs" in the technologies of SDI referred to by Dr. Keyworth in his resignation speech?
2) What were the results of the "Keyworth study" on the Advanced Technologies of SDI?
3) To what extent have developments on the technologies of SDI progressed at a greater pace than expected in the Fletcher Commission study? (Jastrow/Seitz article Wash. Times Dec. 3, 1985)
4) Is there any new information on the feasibility of various technologies for the SDI program?
5) Regarding Soviet efforts at developing countermeasures, is there any new information concerning Soviet limitations at developing new countermeasure technologies?
6) How does SDIO respond to the argument that laboratory testing of technology is not an accurate measure of the systems real field performance?

Political:

1) How does SDIO plan to respond to the Senate coalition efforts at limiting SDI funding in the next defense budget?
2) To what extent is SDIO staying within its proposed spending budget (re: Report to Congress FY86)?
3) Is there any new data regarding the system's cost effectiveness "at the margin?"
4) What is the impact of SDI on arms control and can it (will it) be used later on for negotiating purposes?

Technical-Political (Startegic)

1)Does the President's announcement of two days ago concerning the U.S.'s temporary adherence to SaltII have any impact at all on the SDI program?

2) Has the direction of the research program changed at all since SDI's inception? (In Foreign Affairs, 1985, Harold Brown suggested scrapping some of the programs in SDI while emphasizing research in other fields of research)
3) How does SDIO respond to concerns about "Strategic Instability" during the transition from offensive to defensive systems?
4) How does SDIO respond to the assertion that if the SDI system will be "surgically precise", then it could easily be considered an offensive system?
5) How does SDIO respond to claims that unlike the President's suggestion that SDI will be used to protect civilian popoulations, SDI will do no more than to protect missile silos?

OTHER QUESTIONS —

GET:-SDIO FY86 REPORT TO CONGRESS MAY 1986
-SDIO REPORT TO CONGRESS 1985
-S-D-I : DEFENSIVE TECHNOLOGY STUDY "Fletcher Commission report March 84