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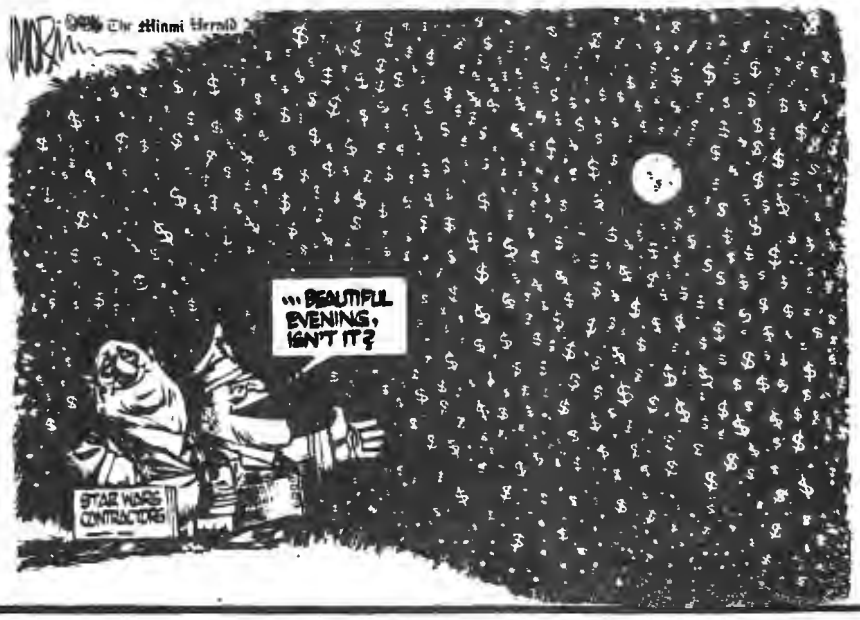

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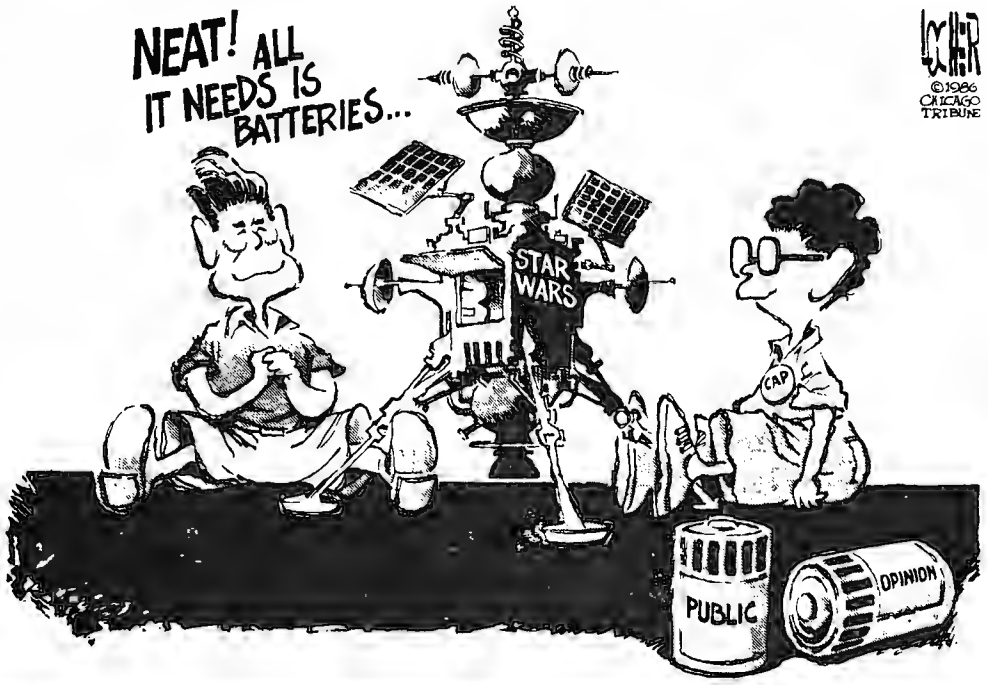

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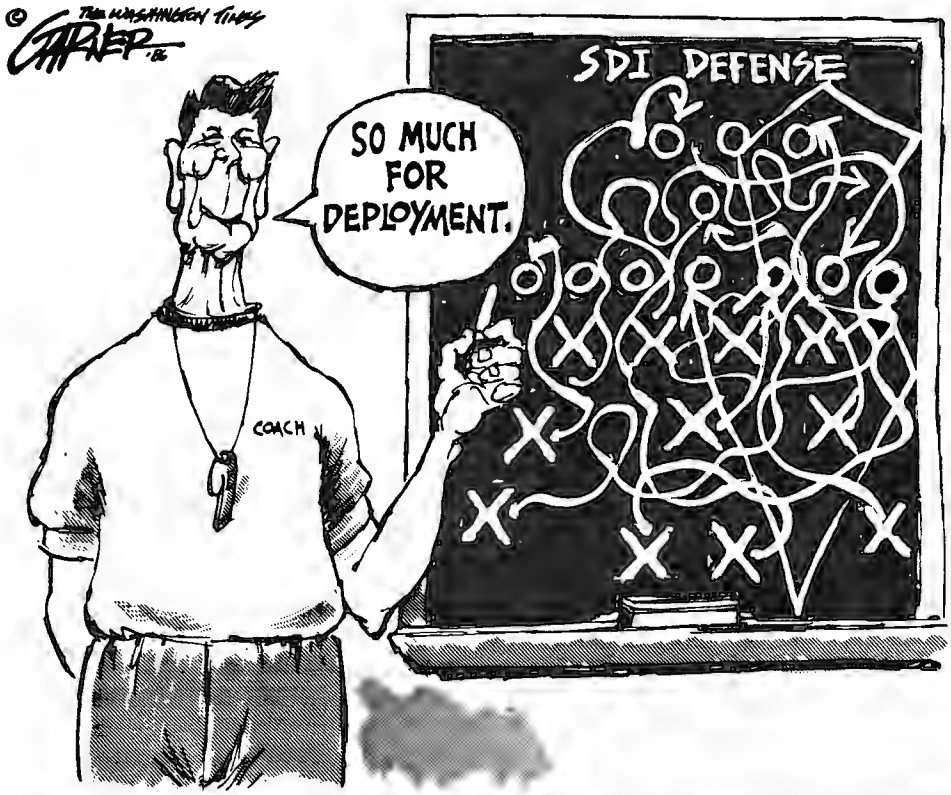

SIGNAL June 1986 Pg. 7

ASAT Debate

Representatives Les Aspin (D-WI) and George E. Brown, Jr., (D-CA) have called on Congress to kill the Air Force's antisatellite (ASAT) program, charging increased costs, delayed scheduling and poor performance of the current ASAT system under development.

In a joint statement, Aspin and Brown cite a General Accounting Office (GAO) classified draft report that the ASAT program will cost $5.3 billion, an increase of 51 percent from the Air Force's original proposal. Aspin and Brown also argue that the ASAT system's date of full operational capability has been delayed five years: one year due to a congressionally imposed testing moratorium (see *SIGNAL*, February 1986, "ASAT Test Ban," page 6) and four years caused by "program problems." Finally, the Congressmen contend that the F-15 fighter plane's engine may not be able to achieve the necessary velocity to launch an ASAT missile. They note that increasing the engine's performance will reduce engine life, creating further increased costs.

However, Aspin and Brown acknowledge that ground based lasers are "one of the most technologically promising" ASAT approaches, and space based lasers "are another possibility." These systems should be funded "elsewhere in the current [FY 87] budget."

In a refutation to Aspin and Brown's arguments, Representative Jim Courter (R-NJ) contends that the ASAT program's costs have increased only by 17 percent, from $3.5 billion to $4.1 billion. This increase is caused partially by the $150 million in mission control costs, which were not included in the original ASAT program, he argues.

Addressing the ASAT program's schedule delays, Courter calculates three years of delay and attributes two-and-one-half years of that delay to congressional action: one year from the congressional ASAT ban, one year from the congressional elimination of FY 86 missile production funds and six months from the late release of FY 84 advance procurement funds.

Finally, Courter reiterates the Air Force's claim that the F-15 can execute its mission with engines delivering average thrust outputs. He adds that "there is no technical reason that the initial ASAT system, if successful, could not be upgraded in the future to respond to new threats and to incorporate advances in technology."

DALLAS MORNING NEWS 28 June 1986 Pg. 4

Weather or Not

Defense Secretary Caspar W. Weinberger has told the House Appropriations subcommittee on Dept. of Defense that Strategic Defense Initiative is developing methods of **guiding and directing lasers through atmospheric turbulence that officials previously felt could not be surmounted.** One plan centers on boring holes through clouds. Weinberger, who had referred to successful tests in Hawaii last year involving degrading effects of the atmosphere on laser beams, said at the time "this disposes of the favored sneer of those opposed to strategic defense that it will only work in good weather." That set off Rep. Les AuCoin (D.-Ore.), who asked Weinberger in closed session what the weather actually was at the time, and Weinberger said "Heavy overcast and rain." When AuCoin said his information was that it was clear weather, the secretary added: "It was also obscured by smoke from a volcano." But he promised more information and when the proceedings of the closed session were published last week, the committee clerk noted: **"In editing the transcript, the department notified the committee that 'further research revealed that [the weather] was actually clear.'"** No matter, said DOD, if ground-based lasers are deployed as part of SDI, multiple sites will be selected on the basis of historic weather patterns.

SAN DIEGO UNION 2 July 1986 Pg. 1

U.S. says 'Star Wars' rocket test successful

By L. Edgar Prina
Copley News Service

WASHINGTON — Defense Secretary Caspar W. Weinberger yesterday announced the successful test of a ground-launched rocket against a hypersonic "missile" target and said it advances the United States "much further" toward the goal of a nuclear ballistic missile defense.

The test shot took place Friday over the White Sands Missile Range in New Mexico. It was conducted by the Army's flexible lightweight agile guided experiment (FLAGE) project for the Strategic Defense Initiative, otherwise known as "Star Wars."

Weinberger said at a Pentagon news conference that while the FLAGE program is aimed at building a defense against short-range missiles, many of the same technologies could be used to destroy long-range weapons, such as intercontinental ballistic missiles (ICBMs).

The cone-shaped metal target in Friday's test was powered by a rock-

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TEST...Continued

et motor after it was dropped from a plane at 44,000 feet. It was streaking at 2,160 miles an hour when it was destroyed at 12,000 feet by the 12-foot-long FLAGE vehicle, which was traveling at 1,920 mph.

The FLAGE vehicle had a built-in homing radar and a computer that used the radar to steer it by firing some of its 216 shotgun-shell-sized solid-rocket motors.

The test was the fifth in a series since January 1983.

Weinberger used the test results to try to clarify what some members of Congress have said is confusion within the administration over the goals of President Reagan's SDI research program. At the same time, he criticized congressional attempts to slash the fiscal 1987 budget request and "to hamper the goals" of the SDI.

"In cutting our SDI request from $5.3 billion to $3.9 billion, and suggesting that we no longer concern ourselves with population defense, the 10-9 majority of the Senate Armed Services Committee would destroy the principal goal of the President's program," Weinberger asserted.

"It is not our missiles we seek to protect, but our people, and we must never lose sight of that goal."

Weinberger warned that "a myopic focus" on terminal defense could skew the U.S. research effort and lead it away from promising technologies.

He said defense solely of U.S. military assets, sites or missile silos "is not and never has been the goal" of SDI.

"A strategic defense initiative that comprehended only the protection of a retaliatory force and abandoned the objective of a thoroughly effective defense of people would not fulfill the President's decision to carry out this program," he said.

Weinberger said Congress should ask itself whether it was willing "to abandon the defense of the American people" by reducing the SDI budget.

On another matter, Weinberger said he had no information or evidence that any of the stories coming out of Libya, alleging that the bodies of two U.S. airmen lost in the recent attacks on Libyan targets had washed ashore, are true.

Firms Obtained SDI Orders Totaling DM100 Million
DW021301 Bonn DIE WELT in German 2 Jul 86 p 1

[Report by "CO": "SDI orders for German firms"]

[Text] Bonn — FRG firms have so far obtained SDI orders totaling about DM100 million. They hold first position among all Europeans, including the British who tried especially hard to get SDI orders, and who recently achieved research contracts of more than 14 million.

Recent reports saying that the participation of German firms in the SDI program does not pay off as much as expected, therefore, are unfounded. According to experts, the interest of the Americans to use the abilities of German industry and science for SDI is by far greater than generally reported.

DEFENSE DAILY 3 July 1986 Pg. 17

SOVIET AIRBORNE LASER LABORATORY DESTROYED

The Soviet Union's airborne high energy laser test vehicle program has suffered a catastrophic failure resulting in the loss of the program's only aircraft laboratory.

The Soviet laboratory, a converted Il-76 transport, apparently suffered a fire that totally destroyed the aircraft on the ground at the air base at Shchelkovo two weeks ago. Reconnaissance satellite photographs had recorded the high energy laser test vehicle at the Shchelkovo base only hours before the fire. Subsequent photography showed the destruction of the aircraft.

The Il-76 aircraft equipped by the Soviets as their airborne high energy laser research vehicle had been in use for several years and its mission is believed to have been similar to the U.S. Air Force ALL (Airborne Laser Laboratory), a highly instrumented NKC-135 aircraft investigating the integration and operation of the high energy laser from the airborne laboratory to an airborne target.

The Air Force completed the initial phases of the ALL research program on July 25, 1983, and the aircraft is now in a flight readiness status at Kirtland AFB, N.M. for "potential future missions," Air Force officials said yesterday.

COLORADO SPRINGS GAZETTE-TELEGRAPH 3 July 1986 Pg. 7

'Star Wars' still not a bargaining chip, White House aides say

Knight-Ridder Newspapers

WASHINGTON — Though President Reagan has indicated his willingness to engage in serious nuclear-arms bargaining with the Soviet Union, high-level White House officials insist he will not yield to a key Russian demand that research be cut short obthe Strategic Defense Initiative — popularly known as "Star Wars."

In a speech last month in Glassboro, N.J., and in a subsequent interview with the Los Angeles Times, Reagan signalled a willingness to engage in give-and-take negotiations with the Soviets. Although his remarks in the newspaper interview were ambivalent about how far he was prepared to go to reach an arms-limitation agreement, he seemed to hint that SDI was open to negotiations.

In the last several days, however, well-placed White House officials have said in separate interviews that Reagan will stand fast against any Soviet effort to curtail SDI research, including testing. Their comments seem to foreshadow a negative response to the Soviets' latest arms control overture.

According to Tass, the Soviet news agency, Soviet leaders have offered to make significant cuts in the numbers of their land-based heavy missiles in exchange for a U.S. agreement to restrict SDI research to the laboratory. Though such an exchange has been dubbed the "grand compromise" by some arms control advocates, the White House officials ruled it out.

Said one official, "What we are not willing to do, and the president has made this eminently clear, we are not willing to restrict research in SDI for anything. . . . It is not a bargaining chip."

Said another White House aide: "We definitely intend to continue the research program but we will talk about deployment. We have not changed our basic position. Now we are thinking through our position and will try to see if there are some new aspects we could propose. But don't look for any radical change."

Reagan himself has said that the United States should proceed with research and field-testing of SDI systems, then share the technology — once it is perfected — with other countries, including the Soviet Union.

As part of that process, the president has indicated that actual deployment of Star Wars weaponry could be a negotiable subject with the Russians when the hardware proves out after research and testing.

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CHRISTIAN SCIENCE MONITOR
3 July 1986 Pg. 10

Weinberger resists 'star wars' funding cuts

By the Associated Press

Washington

Defense Secretary Caspar W. Weinberger is urging Congress to resist making cuts in "star wars" research, arguing that the missile defense program is currently making important strides forward.

Mr. Weinberger said that in an experiment at the White Sands Missile Range in New Mexico last Friday, a small missile successfully destroyed a target moving more than three times the speed of sound.

It was the first time that the missile had been fired at a moving target and used its on-board guidance system to track and destroy the target by direct impact, Weinberger said.

"It's not our missiles that we seek to protect but our people, and we must never lose sight of that goal," he said at a news conference Tuesday at which he defended the Pentagon's 1987 budget request.

The Senate Armed Services Committee recently voted 10 to 9 to slash $1.4 billion from the Defense Department's $5.3 billion fiscal 1987 request for star wars, formally known as the Strategic Defense Initiative, and to restructure its goals.

Weinberger called both moves improper and said the Senate panel was endangering the "noble purpose" of star wars at a time when the research was beginning to bear fruit.

The Senate committee also voted to recommend that President Reagan change the emphasis of star wars to focus on the defense of America's nuclear arsenal instead of protecting the entire country and allies ot the United States.

The star wars project is an effort to develop lasers and other exotic weapons that could be used to automatically shoot down enemy missiles.

"These congressional cuts in the SDI budget would seriously impair our ability to conduct and continue vigorous research," Weinberger said.

"I'm concerned that the Senate committee may give us a defective budget to conform with a defective strategy," Weinberger said.

FLIGHT INTERNATIONAL 5 July 1986 Pg. 2

SDI chief opposes cuts

WASHINGTON D.C.

Cuts in funding have forced major changes to the Strategic Defence Initiative (SDI) programme. This could lead to delays in the research effort and increased costs in the long term, writes **Julian Moxon** from Washington D.C.

The 1986 report, issued to Congress by the SDI office last week, looks back on the second full year of the programme as a "challenging and exciting year," in which events moved very quickly. Much "innovative and inventive" work was carried out. "We have plotted a course, and are now well under way," says SDI programme chief Lt Gen James Abrahamson.

Nevertheless, controversy rages over the future funding and direction of President Reagan's programme. Abrahamson points out the dangers of reducing funds on a project that has already cost more than $1,500 million in US industry and research contracts. Congressional demands for cuts of $1,300 million in the $4,800 million which President Reagan has requested in the 1987 budget could have a "dramatic" effect, says Abrahamson.

The principal result would be significant delays in the early-1990s timescale for a decision on whether to develop and deploy successful SDI technologies, he says. The programme would be riskier, since many "fall-back" options being pursued alongside the main efforts would have to be dropped. "These can only be dropped once," he says, addressing those calling for greater cuts.

Another undesirable effect of cutbacks, argues Abrahamson, is that it is less easy to produce early visible results, "which means that some of our best people get discouraged, and might leave the programme".

Despite all this, it seems certain that cuts will be made, driven largely by a five-year plan which has been proposed by Senators Gramm and Rudman to eliminate the $200,000 million US budget deficit. Funding will probably be held at last year's $2,700 million level, with an allowance of around 3 per cent for inflation.

The SDI report is much thicker and more comprehensive than that issued last year, and provides details of what are described as "major breakthroughs" in several areas. Abramson says that free-electron lasers have ousted chemical lasers as the most promising directed-energy weapon, and that considerable advances have been made in the hardening of space-based infrared detectors. These are vital for locating Soviet missiles at lift-off.

CHIP...Continued

But the Soviets, administration officials said, do not want the U.S. program to proceed that far.

"The Soviets have their own SDI," said one high-ranking White House official, referring to what other arms-control experts say is chiefly a rudimentary anti-missile defense system around Moscow, "and in some respects it is more advanced than ours. They've been working on it for a long time. The Soviet motive is pretty clear. They'd like to put enough pressure on us to get us to stop . . . They want to proceed at whatever pace they can afford with their program to get it first."

"The Soviets have their own SDI," said one high-ranking White House official, referring to what other arms-control experts say is chiefly a rudimentary anti-missile defense system around Moscow, "and in some respects it is more advanced than ours They've been working on it for a long time."

MILITARY SPACE 7 July 1986 Pg. 8

SDIO opens spin-office

Medical uses of the free electron laser lead the pack in SDI civil applications, according to Capt. Chuck Houston of SDI Organization's Education and Civil Applications Office.

The office, relatively new even by SDIO standards, was initiated by SDIO director Lt. Gen. James Abrahamson to "correct misinformation about SDI" and to examine non-military applications of SDI technology. Abrahamson's philosophy in starting the office, according to Houston, was that "the American taxpayer deserves some return that he or she can look at, and see that something other than defense can come out of SDI."

Although "there aren't a whole lot of applications yet (other than medical uses)," Houston hopes that SDI technology can be used for agriculture and materials.

Ten universities are under contract, through the Office of Naval Research, the Air Force Office of Scientific Research, and the Uniformed Services University of Health Sciences, to study medical applications of free electron lasers (FELs).

Universities involved in this research include Princeton, University of California at Irvine, Northwestern, Utah, University of California at Santa Barbara, Stanford, Baylor, Purdue and Michigan. Massachusetts General Hospital in Boston is also studying biomedical applications of these lasers.

"Congress' aim was to use FELs for surgical applications. That's what we have attempted to do," Houston told *Military Space*. "Right now, the technology is still quite new, and has mostly physics applications. The FEL is quite large — not the size of a refrigerator, but the size of a room — and the mobility is very limited. There are only a few of them scattered around the United States. It's not yet available in stores — you can't just go and pick one up."

He added that the research was still very theoretical and somewhat

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SPIN-OFFICE...Continued

limited, although laser technology is used for applications as eye surgery and blood work: "It cauterizes as it goes."

He concluded that "the potential is certainly there; there have to be avenues we haven't yet explored in determining civil applications."

AEROSPACE DAILY 7 July 1986 Pg. 25

FRENCH SDI ROLE: Administration officials say the U.S. will limit the participation of French companies in the Strategic Defense Initiative because of France's continuing trade with Eastern Bloc countries. "France still sells significant amounts of high tech goods to the East," causing concern for the security of U.S. technology, says one analyst. Matra and Aerospatiale are preparing to submit bids for an SDI theater defense architecture study that would be part of a European anti-ballistic missile segement, they say.

AND ISRAEL SDI STUDY: Israel is preparing a theatre defense architecture study for NATO's central region instead of its own territory, U.S. officials say. But NATO specialists say that Israel may soon face a short-range missile threat like that posed to Europe by Soviet SS-21s, -22s, and -23s.

MILITARY SPACE 7 July 1986 Pg. 7

Soviets want what we sell

The arrest last month of a senior Soviet Air Force officer on espionage charges once again underscored the Soviet's active interest in acquiring information on U.S. military space programs.

FBI officials said that Col. Vladimir Izmaylov, senior air attache at the Soviet embassy in Washington, was apprehended last month in near the scene of a "dead drop," where the FBI claims he planned to receive classified information from a U.S. Air Force officer.

While Izmaylov claimed that he was looking for a fishing spot, the unnamed USAF officer — who was working with the FBI — told counterintelligence agents that the Soviet was most interested in key technologies such as Stealth, SDI and transatmospheric vehicles. FBI officials running the sting operation said Izmaylov was arrested because of the limited amount of false information they could provide without raising Soviet suspicions.

FBI officials allege that Izmaylov was a high-ranking official in the GRU, the Soviet military intelligence service. GRU agents have been extremely active in the Washington area in recent months, FBI officials say, especially in the Rosslyn area of Arlington, Va., the location of offices for many defense companies and the Defense Advanced Research Projects Agency *(MS 9/30/85)*.

One frequent visitor to Rosslyn is Lt. Col. Alexei Yeremenko, an assistant air attache and former subordinate of Izmaylov's. Yeremenko frequently visits Pasha Publications' office in Rosslyn, paying in cash for books on military and civil space, SDI and advanced military computing research.

Yeremenko and other Warsaw Pact diplomats also attend unclassified conferences on SDI in the Washington area sponsored by Pasha and technical societies. "If it's unclassified," one SDI Organization official said. "There's absolutely no way you can keep them out."

"If we see one we know, we just invite him to tell the audience about the Soviet SDI program." he said. "They usually don't come back after that."

WASHINGTON POST 8 July 1986 Pg. 9

Soviet General Cites 'Compromise' on SDI

British See Visits as 'Charm Offensive'

By Karen DeYoung
Washington Post Foreign Service

LONDON, July 7—A senior Soviet military official said here today that Moscow's recent arms control proposals contain "a very specific compromise" providing for continued U.S. research into space defense systems, and urged Western Europe to consider this and other Soviet offers in taking sides on weapons negotiations with Washington.

Gen. Nicholai Chervov, head of the Soviet armed forces general staff directorate, said that "Europeans cannot stand on one side on these issues." Britain in particular, he said, "can exert more active influence in a positive way" over U.S. arms control negotiating postures.

Chervov's remarks came in a speech and question-and-answer session at the Royal Institute of International Affairs. His appearance was part of a five-day visit during which he has met with British officials, held a press conference and appeared in public session before the House of Commons Foreign Affairs Committee to explain Soviet arms control policy.

To British officials, Chervov's trip, combined with visits here and elsewhere in Western Europe by other Soviet officials in recent months, is part of a new round of Moscow's "charm offensive." Begun around the time of last November's U.S.-Soviet summit meeting, the offensive appeared to have been aborted shortly thereafter when relations between Moscow and Washington took a downturn.

Now, with a new portfolio of arms control proposals to display, and after several recent U.S. moves that have disappointed Western Europe, the Soviets seem to feel the time is ripe to launch a new round of appeals.

According to British and U.S. officials here, Moscow believes Europe is open to influence because it remains concerned about the Reagan administration's apparent intention to end compliance with the SALT II arms limitation treaty, its refusal to put any aspect of its Strategic Defense Initiative on the negotiating table, and its skeptical reaction to recent Soviet proposals.

Both Britain and Washington feel the Soviets once again have overestimated the likelihood of a real division within the North Atlantic Treaty Organization on these issues. They noted that a number of points Chervov raised in his speech today were misleading in the western view—including his reference to space defense.

"On Star Wars," Chervov said, referring to the SDI program for a space-based missile defense system, "the Soviet Union has actually made a very specific compromise . . . limiting it to research work."

"The Americans say Star Wars is only a research program. Of course, we don't agree. It is a military program, a program for creating weapons," Chervov said. But, he added, "we've tried to meet the Americans. We say, let's limit it to research in laboratories."

The previous Soviet position, he said, "was that everything was to be banned, including research." The Soviet concession, Chervov said, was "done to stimulate discussion" at the Geneva arms talks, "to lead to a reduction in strategic weaponry."

The United States argues that laboratory research on space defense already is allowed under the Antiballistic Missile Treaty, and that neither research nor testing—still rejected by the Soviets—requires Moscow's agreement.

At the same time, the Soviets still have not moved on what the West considers a crucial East-West issue: the scheduling of a summit this year between Reagan and Soviet leader Mikhail Gorbachev.

But officials here noted that Chervov's comments on SDI still could be considered a small sign of progress in that they made explicit what previously had been vague and inconclusive official Soviet references to Moscow's possible acceptance of SDI research as a negotiating position.

Several officials said they felt that Soviet efforts to appear optimistic about the overall arms control process were "not necessarily a discouraging development," in the words of one western diplomat who declined to be named.

The current Soviet slogan, according to one British official, is, " 'We're the good guys.' . . . They feel they have a pretty good pitch to deliver, and they want to deliver it to as many people in Western Europe as possible." The official professed to remain unconvinced.

"It's interesting to see," another official here said. "It's a product of their present phase of high-level" diplomatic activities in which the Soviets "are concentrating pretty hard on Britain."

Next Monday, Soviet Foreign Minister Eduard Shevardnadze is scheduled to come to London for a two-day visit, during which he is scheduled to meet with British Foreign Secretary Geoffrey Howe and Prime Minister Margaret Thatcher.

Other exchanges have been going on throughout Western Europe, with French President Francois Mitterrand now in Moscow returning an earlier Gorbachev visit.

In a press conference today in Bonn, chief Soviet arms negotiator Viktor Karpov repeated Chervov's London description of Soviet compromises on space defense, Reuter reported. Karpov also said he believed an East-West ban on chemical weapons could be agreed to and signed this year.

In an assessment that U.S. and British officials questioned, Karpov said most of the major differences between Moscow and Washington on chemical weapons had been resolved, and "it is possible to reach an agreement in the near future, before the end of this year."

President Reagan's Radio Speech WTOP Radio

July 12, 1986 12:05 P.M. Washington, D.C.

SDI Program

PRESIDENT RONALD REAGAN: ...we showed the world what it means to love liberty. The spectacular celebration of our independence and Miss Liberty's centennial will likely be described by historians as a reflection of the good will, joy, and confidence so apparent in our country.

Instead of focusing on problems, America is looking for solutions. Instead of fretting about this or that shortcoming, we're out creating, building, and making things better. Instead of lamenting dangers, we're putting our best minds to work trying to find ways of making this a safer, more secure world.

And that's what I want to talk with you about today, our major research effort called the Strategic Defense Initiative, SDI, which is aimed a ridding this planet of the threat of nuclear annihilation.

Back in 1983 we enlisted some of America's top scientists and set in motion a research program to say if we could find a way to defend mankind against ballistic missiles, an anti-missile shield, if you will. Our SDI research is searching out a more effective, safe, and moral way to prevent war, a deterrence based on defenses, which threaten no one, a deterrence that will be viewed as a success not by the threat of deadly retaliation, but instead by its ability to protect. And never was a purely defensive system so sorely needed.

Since the early 1970s, the Soviet Union has been racing forward in a vast and continuing military buildup, including the expansion of their offensive nuclear arsenal and an intense effort to develop their own strategic defense. And as described in a publication issued last October by our State and Defense Departments, the Soviets also have deployed the world's only anti-ballistic-missile system.

These Soviet strategic defense programs have been termed Red Shield in an article in this month's Reader's Digest. They were confirmed in an open letter issued last month by a group of 30 former Soviet scientists now living in the United States. In stark contrast, we are defenseless against the most dangerous weapons in the history of mankind.

Isn't it time to put our survival back under our own control?

Our search for an effective defense is a key part of a three-pronged response to the Soviet threat. We also have been

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PROGRAM...Continued

moving ahead to modernize our strategic forces, and, simultaneously, to reach fair and verifiable arms reduction agreements with the Soviet Union. The Soviets have yet to agree to arms reduction, despite the strenuous efforts of several U.S. Administrations.

However, our SDI research to make nuclear missiles less effective also makes these missiles more negotiable. And when we talk about negotiations, let's be clear. Our SDI research is not a bargaining chip. It's the number of offensive nuclear missiles that need to be reduced, not the effort to find a way to defend mankind against these deadly missiles. And reliable defenses could also serve as insurance against cheating or breaking out of an arms reduction agreement.

All this makes it evermore important to keep our strategic defense research moving forward.

We've set up a well-managed program which in just over three years has already accomplished much. Even faster progress than expected has been made in developing the system's eyes -- scientists call them sensors -- and it brains, which guide and intercept [unintelligible] target, and methods of stopping incoming missiles, especially with non-nuclear means.

Technological advances now permit us to detectand track an aggressor's missiles in early flight. It is in this boost phase that missiles must be intercepted and knocked out to achieve the protection we're looking for.

There have been some major achievements in the diplomatic field, as well. Great Britain, West Germany, and Israel have signed agreements to participate in the research, and talks with other major allies are expected.

Nothing of great value, of course, comes cheap. But a defensive system which can protect us and our allies against all ballistic missiles, nuclear or conventional, is a prudent investment. I'm sorry to say, however, that some members of Congress would take a shortsighted course, deeply cutting the funds needed to carry out this vital program. So it's imperative your voice is heard. In the weeks ahead it would be a tragedy to permit the budget pressures of today to destroy this vital research program and undercut our chances for a safer and more secure tomorrow.

President Eisenhower once said, "The future will belong not to the faint-hearted, but to those who believe in it and prepare for it." I agree with that, and I know you do too.

Until next week, thanks for listening and God bless you.

WASHINGTON POST 10 July 1986 Pg. 1

Star Wars Compromise Discussed

Reagan Might Delay Deployment if Soviets Slash Weapons

By Walter Pincus and Lou Cannon
Washington Post Staff Writers

The outlines of a "grand compromise," in which deep cuts in the superpowers' offensive nuclear arsenals would be traded for a delay in the deployment of a "Star Wars" missile defense system, have reemerged in Reagan administration discussions of a response to the latest Soviet arms control proposal, administration officials said yesterday.

But Secretary of State George P. Shultz and Defense Secretary Caspar W. Weinberger disagree so sharply over whether the United States should consider such a swap that the schism ultimately will have to be resolved by President Reagan, the officials said. Weinberger opposes any limits on future deployment of missile defenses, while Shultz reportedly is intrigued by the possibility if it leads to a significant reduction in nuclear weapons.

These sources emphasized that Reagan has reached no decision and would insist on a 50 percent reduction in Soviet and American strategic arms—rather than the 35 percent most recently proposed by Moscow—before considering any limits on his Star Wars program.

Reagan remains unwilling to curb research under his Strategic Defense Initiative (SDI), as Star Wars is formally called, according to these sources, who favor the grand compromise idea. But one White House official said that a ban on deployment—perhaps until the mid-1990s—of any product of this research could become the key to a compromise in which both sides would also agree to deep cuts in offensive nuclear weapons.

Soviet leader Mikhail Gorbachev last month sent Reagan a letter containing additional details of a new Soviet arms offer presented in Geneva on June 11. White House spokesman Larry Speakes said yesterday that drafts of a proposed response have been prepared specifying which ideas are acceptable and unacceptable, and also presenting "our ideas on how to proceed."

More is involved than just the latest round of nuclear arms negotiations. The Soviets have informed U.S. diplomats that a positive response to their proposals is the key to setting a date for a second Reagan-Gorbachev summit and a preparatory meeting between Shultz and Soviet Foreign Minister Eduard Shevardnadze.

Publicly, administration officials have given no details of a new U.S. negotiating position, and Reagan has brushed aside questions about what he will do to resolve the conflict within his Cabinet. The president did acknowledge in an interview with the New York News on Tuesday that the Soviets had made "a concession" in saying that they might "permit research" on SDI.

Privately, aides acknowledge the fundamental and continuing conflict between Shultz and Weinberger over what, if any, concession on SDI the president should offer in his response to Gorbachev.

The Soviets have proposed that the United States agree not to withdraw from the 1972 Antiballistic Missile (ABM) treaty for 15 to 20 years, which would bar deployment of any "Star Wars" defense system during that period. State Department officials who recognize that Reagan will not accept the proposal in this form nonetheless consider it a significant shift toward genuine negotiation.

While Gorbachev has said on occasion that the Soviets might accept SDI research, the Soviet position at Geneva has until now called for banning all research directed toward space defense. The newest Soviet proposal includes provisions dealing with research and testing that some U.S. officials believe open the way to productive negotiations.

Shultz and Weinberger agree that SDI research should not be inhibited in any way. Reagan has repeatedly made this point, most recently last Friday in a meeting with French President Francois Mitterrand, who is meeting with Gorbachev in Moscow this week. Some U.S. officials now believe that the Soviets understand that space defense research is a non-negotiable item for the Reagan administration, and that this understanding led to their new proposal.

Where Shultz and Weinberger part company is over deployment. Almost as soon as the Soviet offer became known, Weinberger publicly denounced it and said "the Soviets know you can't get funding for a program if you've said you're not going to use it for 10 years." The defense secretary called the Soviet plan "a side door" to killing SDI, which Congress is now financing at a rate of about $3 billion a year.

Shultz reportedly was angry that Weinberger had publicly dismissed the Soviet offer even before it was examined in detail. The secretary of state is believed to hold the view that 10 years is too long to bar deployment but that five or six years should be considered, if this would be part of a package including the deep reductions in nuclear arsenals desired by the president.

Officials said that Reagan, who in the past four years has tried to mediate differences between his two powerful Cabinet officers, will have to resolve the conflict. National security affairs adviser John M. Poindexter and White House chief of staff Donald T. Regan have failed in efforts to bridge the gulf.

The grand compromise idea—trading offense for defense—was first proposed in 1985 by then-national security affairs adviser Robert C. McFarlane. It appeared to die after relations chilled following the Reagan-Gorbachev summit last No-

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LOS ANGELES TIMES 13 July 1986 Pg. 1

'Star Wars' Leads All Defense Costs

Fast Becoming Permanent Fixture in Military-Industrial Firmament

By JAMES GERSTENZANG, *Times Staff Writer*

WASHINGTON—President Reagan's "Star Wars" program, despite intense opposition in Congress and elsewhere, is fast becoming a permanent fixture in the military-industrial firmament.

By the time Reagan leaves office in 1989, the space-based system of anti-missile defense may be so firmly ingrained in the Defense Department's budget and so vital to the profit margins of the nation's defense contractors that the new President, whatever his personal inclinations, will have difficulty dislodging it.

"Even if a Democratic Senate is elected in 1986 and a Democratic White House in 1988," said Gordon Adams, director of the Defense Budget Project, a private group, "you may have a base built for the program that is essentially unstoppable."

In Research Stage

The Strategic Defense Initiative, as the program is formally known, remains in the research stage, with no decision yet made to attempt to assemble its computers, communications systems, airborne sensors, satellites, mirrors and lasers into a working anti-missile defense. But it is already the single most expensive element of the Defense Department's budget.

Reagan asked Congress for $5.4 billion for SDI in fiscal 1987, which begins Oct. 1. That is nearly double his next biggest request—$2.8 billion to procure F/A-18 jets for the Navy.

Although the Senate Armed Services Committee has recommended reducing his SDI request to $3.9 billion and the House Armed Services Committee has approved only $3.7 billion (the equivalent of $3.577 billion in 1986 dollars), even the lower figure represents an increase of $700 million over the current "Star Wars" budget of $3 billion.

"Reagan will ask for incredible amounts and 'settle' for one-half of infinity," a weapons expert for Congress who has also worked in the Defense Department said.

John Pike, the Federation of American Scientists' associate director for space policy, said the program is climbing toward the $7.5 billion that government documents indicate that Reagan plans to seek for 1989. If it gets there, Pike said, "it would be real hard to turn it off."

Not Yet Proved Feasible

"There would be too many jobs in too many congressional districts," Pike said. "Something that big isn't a weapons program. It's a jobs program."

Research to date has yet to establish whether it is feasible to build a space-based system to protect the United States and its allies from missile attack. But the Defense Department insists that research is proceeding smoothly.

"We're making progress in the fundamental technology that leads to this decision for a strategic defense system some day," said Air Force Lt. Gen. James A. Abrahamson, director of the Defense Department's SDI Office. "And that's coming faster than people realize, even with the cutbacks" voted by Congress in the SDI budget.

"Star Wars" still faces formidable obstacles if it is to become an integral part of the nation's military arsenal. While the military services are dutifully recognizing Reagan's determination to proceed with "Star Wars," they are quietly grumbling that the price tag for the research alone is reducing funds available to buy conventional weapons.

Outside the government, few lobbying groups have embraced the program, and members of Congress are feeling little constituent pressure to support the Administration's budget for it. Nor has "Star Wars" yet reached the stage at which major industries, individual companies and labor unions are relying on it as a major source of income or jobs and are pressing Congress to increase the program's budget.

'A Lot of Momentum'

But Reagan has 2½ years left in office to build more support for "Star Wars." Stephen Daggett, a senior research analyst at the Center for Defense Information, a private group that frequently criticizes defense programs, said the new President would propose reducing the SDI budget at his own peril.

"These projects will have created a lot of momentum," he said. "It would mean canceling some high-visibility demonstration projects, such as a space-based sensor system" to track missile launches.

"Even if the new President and the chairman of the Joint Chiefs of Staff were not enthusiastic, it would be pretty difficult to back out if you've already got 10 $300-million projects," Daggett said. "You can do it, but it will be a tough political decision and you'd take it on the chin."

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COMPROMISE...Cont.

vember in Geneva.

Reagan, who said on May 27 that he would no longer be bound by SALT II, was described as more optimistic than ever that the Soviets are interested in negotiating a new Strategic Arms Limitation Treaty.

COSTS...Continued

Scientists' Pledge

Former President Jimmy Carter bit the bullet in 1977, the first year of his term, and canceled production of the B-1 bomber, which at that point was already producing jobs in 48 states. That was the last major weapons program of his Republican predecessors that he canceled—and Reagan reinstituted the B-1 four years later.

About 6,500 scientists have signed a pledge not to work on "Star Wars." But there are others eager to peer into the world of space weapons.

"When you start talking about ray guns and mirrors in space, you're talking about a wonderful hobby shop," a senior official for a major defense contractor said. "There's nothing better for an engineer. They'd rather work on that than on a new tank."

The Defense Department has carefully orchestrated a new demonstration of "Star Wars" successes every few months: a test missile struck downrange by an interceptor; a flying target rammed at 12,000 feet by a rocket-propelled device homing in on the target's electronic signals; the test firing of a laser in Hawaii against a rocket approximately 350 miles overhead, and the explosion of a nuclear bomb 1,800 feet below the Nevada desert in a $30-million test of the X-ray laser.

"It is important there be some real demonstrations that can't be challenged as stunts," said an aide to several senators who view the program favorably.

Rep. George E. Brown Jr. (D-Colton), a senior member of the House Science and Technology Committee and an SDI skeptic, is aware of the campaign. "Every system, particularly in the aerospace area, is structured to develop a wide constituency," he said. "The same effort is being made in connection with SDI, and it is probably being done more quickly to establish a vocal constituency."

Just as each stage of the Mercury, Gemini and Apollo space programs produced ever more ambitious and promising flights leading the United States toward the moon, SDI is built around a series of experiments, tests and demonstrations of ever-increasing complexity, Daggett said.

"I think the program was deliberately structured to build momentum," he said. "It shows concrete results and achievements to the public at large and Congress. It creates contractor teams working on a project with a concrete result. You have a team established and they're going to want to follow on and have something to do. It creates esprit de corps."

'Important Bricks'

Abrahamson does not quarrel with the comparison to the space program. "These are small, low-cost contracts but important bricks in this technological wall that we're building up rapidly," he said.

Most major defense contractors have created divisions, often directed by vice presidents, to seek "Star Wars" contracts. If they have yet to unleash a major lobbying campaign in Congress for a bigger SDI budget, it may be because of Congress' determination to restrain Reagan's overall defense buildup.

"A lot of them are scared to go up to Congress and say: 'Don't cut SDI,' " said Melissa Moore, a lobbyist with the American Society of Mechanical Engineers. In the current congressional climate, she said, lobbying for the Defense Department's most costly program might merely offend members of Congress.

Small Firms Dependent

Some smaller defense contractors depend heavily on SDI research contracts and might not survive without it, but so far that is not true for major defense contractors. Although they are happy to land SDI contracts, which are typically in the $100-million range, their annual multibillion-dollar gross incomes insulate them from dependence on "Star Wars."

"It's significant to the aerospace industry, but it's not going to make it or break it," said Robert Wahlquist, a vice president and SDI program executive at TRW.

Among the most active private organizations lobbying on SDI's behalf is High Frontier, which promotes military uses of space. High Frontier's director, retired Air Force Lt. Gen. Daniel Graham, said SDI absorbs so much of the Defense Department's research and development funding—fully 10%—that it risks losing adherents in the Pentagon who fear that their own programs will be crowded out of the budget.

"I was a bureaucrat in uniform for quite a while and I know how it works," he said. "You've got your own turf to guard. When the pressures came down on the total defense budget, the representatives (from the services) would give lip service to SDI, but then they'd say: 'What we really want is more tanks, ships and planes.' "

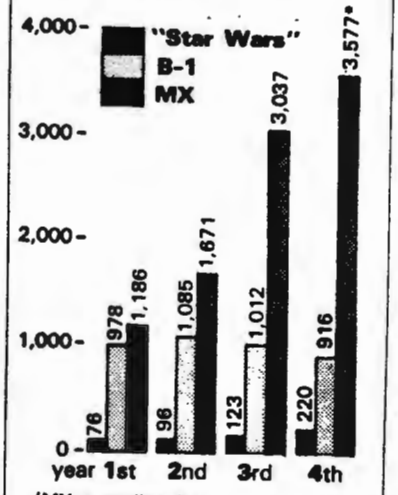
But "Star Wars" critics remain worried that President Reagan will have committed the nation to the program before he leaves office.

"Clearly, this thing has got life in it," a congressional weapons expert said. "It's reached the nine-month point. It might even be born."

AMBITIOUS BEGINNINGS FOR SPACE DEFENSE

Spending for "Star Wars" is outpacing that for two other recent major weapons systems, the MX missile and the B-1 bomber, in the research and development stage. "Star Wars" was begun in 1984, as a continuation of about a decade of anti-ballistic missile research. The MX was begun in 1975 and the B-1 in 1972.

Figures in millions of 1986 dollars, adjusted for inflation.



(MX spending hit a peak in 10th year of program in 1984 of $4.4 billion. Spending on the B-1 peaked in its 14th year, 1985, at $8.2 billion.)

*Amount approved by House Armed Services Committee.

SOURCE: Defense and Energy departments, Federation of American Scientists

Los Angeles Times

ELECTRONIC ENGINEERING TIMES 14 July 1986 Pg. 17

SDI Wants To Triple Spending For Systems, Test Centers

By Jim Van Nostrand

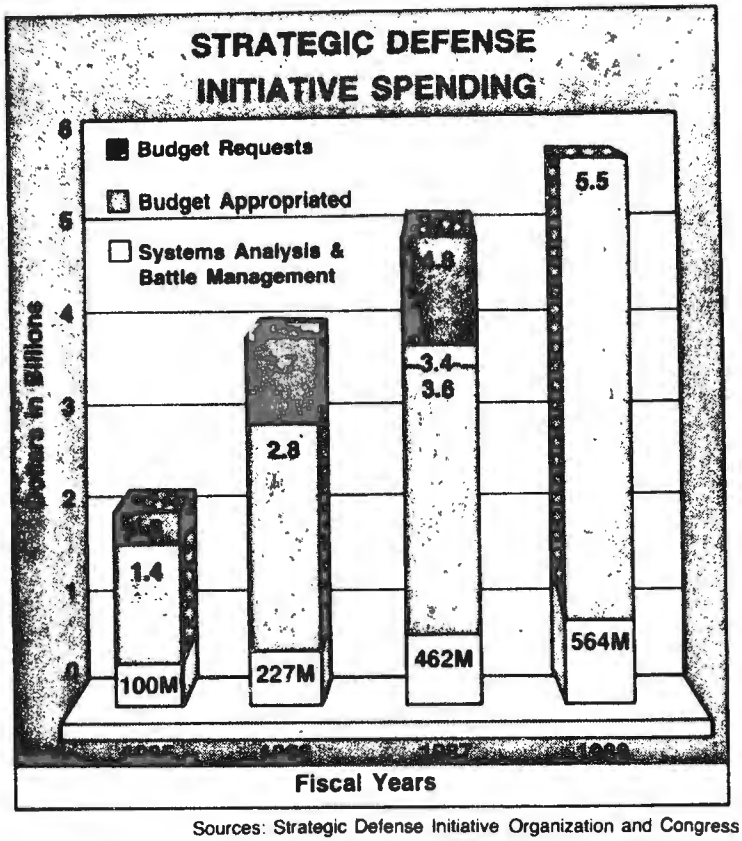
WASHINGTON — The Strategic Defense Initiative (SDI) organization wants to triple spending on "Star Wars" systems analysis and battle management research in 1987 and 1988, but it faces near-certain congressional cutbacks.

Specific objectives include:

- An engineering system capable of producing the very complex software that SDI battle management will require; and
- A national test bed and test facility to evaluate both alternative SDI systems and battle management and command, control and communications technologies and architectures.

The overall SDI research effort has been able to adjust to congressional budget cuts—21 percent in 1985 and 26 percent this year—without losing its objective of reaching conclusions about the feasibility of a ballistic missile defense system in the early 1990s, said Lt. Gen. James Abrahamson, SDI director.

But he recently warned that timetables for the overall program and its key components could not be sustained in the face of new reductions by the House and Senate armed services committees of 29 and 25 percent, respectively, in the $4.8-billion SDI request for 1987.



Sources: Strategic Defense Initiative Organization and Congress

The systems analysis and battle management section of the budget is expected to increase by more than $400 million over 1985.

Systems Analysis

Systems and battle management analysts' major tasks include defining performance requirements for other SDI research projects and grappling with the very high-level computing requirements of missile defense. They got $100.3 million in fiscal 1985 and $227.3 million this year. Funding requests include $462.2 million for 1987 and $564 million for 1988.

"The battle management software to be developed for the SDI may be the most complex ever attempted . . . not only due to the amount of software required but also due to the functions to be carried out," said the latest annual SDI organization progress report.

"The software will need to be reliably modified and adapted to changing defense needs and which can be guaranteed to have desirable behavior under all conceivable stressing conditions," it added.

Significant parts of the software development process should be automated, and an initial set of automated development tools has been produced and is being assessed, the report said.

It predicted a major milestone for software research in a new software engineering system that is planned for operation in 1989 and will be designed to incorporate high-payoff tools and methods.

"A new and very strenuous challenge to the field of distributed computing" exists in the need for highly efficient computing algorithms in a defensive system composed of many space, air and ground components that are widely distributed geographically and that individually may have only limited data on the overall battle situation, the progress report said.

Much of the computer processing for a future SDI system will be done on space vehicles where normal maintenance access is impossible, and the processing power required will greatly exceed the capability of even the highest performance single computing machine.

"A distributed processor will be required [and] multiple processor architectures, because of their built-in redundancy, provide a compelling approach to fault-tolerance," the report said.

It said extensive work was required on both hardware and software for effective management of computing re-

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CENTERS...Continued

sources to ensure, for example, that the operating system does not become a computation-limiting factor in multiple-processor configurations.

Test Bed Project

The national test bed project will have a central national test facility that will tie together test and demonstration capabilities at scattered military service facilities, Department of Energy laboratories and missile ranges.

The test system will be designed for comprehensive and specialized evaluation of SDI systems, technologies and architectures. It will have flexible simulations, including low-to-high fidelity algorithms and displays and hardware-in-the-loop types with, as a minimum, space-based, ground-based and Allied anti-tactical ballistic missile architectures.

Experiments and tests are planned from the minor subsystem level up through large-scale, systemwide, end-to-end experiments and demonstrations. Technologies will include networks, algorithms, processors, software engineering, communications, command and control and man-machine interfaces.

The test facility will be designed to support integration and control of interactive and standalone elements of experiments. This would provide technology verification with integration functions that involve hardware-in-the-loop operations with actual or replica subsystems. These include signal processors, communications controllers, message generators and real or emulated ties with other SDI and non-SDI facilities.

The planned scope of the tests will include defense of the continental United States and U.S. allied countries against intercontinental, submarine-launched and intermediate-range ballistic missiles. The system will also be expected to defend itself against lasers, jammers, spoofers, direct-ascent nuclear and non-nuclear and anti-satellite threats and attacks against terrestrial facilities.

The report also said that planned research on fault-tolerant processors will have five main objectives:

- Definition of fault-causing phenomena at component and system levels;
- Development of fault-tolerant hardware and software strategies;
- Incorporation of the strategies in computing architectures to mitigate the effect of faults;
- Development of the capability to validate and trade between fault-tolerant alternatives.
- The work is also expected to treat nuclear radiation upset and mitigation as a fault with peculiar and far-reaching impacts on SDI system survival.

BALTIMORE SUN 13 July 1986 Pg. 2

Spending cuts would hurt SDI, Reagan says

WASHINGTON (AP) — President Reagan, repeating assertions that his Strategic Defense Initiative program is not an arms-control "bargaining chip," warned Congress yesterday that spending cuts would cripple research just as advances are being made.

"Nothing of great value . . . comes cheap," Mr. Reagan said in his weekly radio address, delivered from the presidential retreat at Camp David.

"A defensive system that can protect us and our allies against all ballistic missiles, nuclear and conventional, is a prudent investment," the president said.

"Our SDI research to make nuclear missiles less effective also makes these missiles more negotiable," Mr. Reagan said.

In the past few days, there have been reports the administration is intrigued by a Soviet proposal to delay deployment of a "star wars" system in return for deep cuts in offensive missiles.

But Mr. Reagan repeated his often-stated position that SDI "is not a bargaining chip."

He said the system was necessary because "the Soviets have yet to agree to arms reduction despite the strenuous efforts of several U.S. administrations."

Despite arguments by critics, Mr. Reagan said that the "star wars" program has accomplished much and that "faster progress than expected" has been made in the research.

The president has asked for $5.4 billion for the program in the next fiscal year, but two key congressional committees have voted to slash funding.

Congress is scheduled to return from its Fourth of July recess tomorrow, and a summer of battles is looming over the defense budget and arms-control policies.

Just before leaving for the holiday, Congress agreed on a new budget blueprint that cut Mr. Reagan's $320 billion Pentagon spending request to $292 billion.

"It would be a tragedy to permit the budget pressures of today to destroy this vital research program and undercut our chances for a safer and more secure tomorrow," the president said.

NEW YORK CITY TRIBUNE 14 July 1986 Pg. 9

FRANK V. VERNUCCIO

Now the Soviets Promise Orbits Full of Goodies To Those Who Disparage SDI

Moscow is dramatically escalating its on-slaught against American space-related defensive programs.

The most skillful of all Soviet propaganda drives began its current high-powered phase last August. A proposal was presented by the Kremlin to the United Nations proclaiming: "There is a growing possibility that space may be turned into the source of a terrible danger of war. Plans are being announced and actions taken aimed at creating and developing space offensive weapons to destroy targets in space and from space, in the air, and on Earth, including creating a wide-scale ABM system with space-based elements. . . Militarization . . . would affect all areas of space activity and would create insuperable obstacles to the development of international cooperation int he peaceful exploration of outer space."

The document omitted mention of the fact that only the Soviet Union had an operational antisatellite system, and that Soviet SDI-type research substantially outspends its American counterpart.

Moscow's usual bluster at the U.N. would generally not be a cause for alarm. However, the Soviets have added a new wrinkle — an unsubtle bribe to induce Third World nations to join in the anti-U.S. diatribe. According to that August proposal, "Rejection of the creation, including scientific research, testing, and deployment of space offensive armaments — and the pooling of state's efforts for peaceful activities in space would help broaden mutual understanding and cooperation. . ." The report goes on to make an unmistakable message: the extensive space facilities of the Soviet Union could be made available to nations that join in a chorus of criticism of American space defense.

The campaign has continued unabated in the world forum, and the bribe reiterated frequently. On June 5, Siegfried Shclickle of East Germany, after announcing that "Well known imperialist circles are trying to gain military superiority and a strategic first-strike capability by militarizing space," repeated the offer that, under the "Star Peace" plan, the Soviet Union, in return for international cooperation against America, would open its space facilities.

The Kremlin has framed its bribe in different ways at different times. On June 4, Moscow's representative to the U.N.'s Committee on the Peaceful Uses of Outer Space stressed that preventing an arms race in space was "an integral part" of a comprehensive system of international security envisaged by the Soviet Union, and that increased "international cooperation" would be the fruit of the "demilitarization" of space — albeit a one-sided demilitarization, since the Soviets refuse to admit their space-weapons research and deployment program even exists. As a side note, Soviet spokesmen stress that the very term "Star Wars" was the product of American culture.

The most powerful of Moscow's assaults came from Prime Minister Ryzhkov on June 12. In his reemphasis of the proposal, he again strongly linked the two sides of the plan, international access to Soviet facilities in return for anti-Americanism: "What it amounts to is two aspects of the single global task of stopping 'Star Wars' preparations and countering them with the alternatives of 'Star Peace,' the exploration of outer space by the joint efforts of all countries for peaceful purposes."

Gaining the support of U.S. members is only an interim step towards Moscow's real target-the American public. The Soviets desperately need the collusion of well-intentioned but easily mislead U.S. citizens who seek peace. Unfortunately, what would be attained would not be a resolution of the space armaments problem, but a continuation of the Soviet space weapons lead.

Frank V. Vernuccio is editor-in-chief of Space Press, *a New York news agency specializing in matters of space exploration.*

AEROSPACE DAILY 14 July 1986 Pg. 66

SDI SHOULD BE PART OF BROADER EFFORT, SENATE ARMED SERVICES SAYS

The Senate Armed Services Committee, in its report on the fiscal 1987 defense bill released Friday, stresses its support for the Strategic Defense Initiative program but says SDI should be part of a broader effort that addresses conventional and nuclear shortcomings.

The Defense Department asked $4.8 billion in fiscal 1987 for SDI, and Senate Armed Services recommended $3.6 billion. The new report, which fleshes out positions taken by the committee late last month (DAILY, June 24)—a comparable House Armed Services Committee report is not yet available—says SDI "serves a number of valid U.S. national security purposes."

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EFFORT...Continued

It adds, however, that the program "should be but one part—albeit an important part—of a broad-based and balanced U.S. technology initiative that addresses the entire range of nuclear and conventional deficiencies in our defense posture."

The report expresses concern that planned SDI funding levels "threaten to absorb an inordinate proportion of defense dollars allocated to research and development." It says that the SDI spending plan for fiscal years 1987-1991 "is excessive in light of the absence of basic architectures for this program and continuing indications of basic disagreements within the Administration as to the program's goals."

The committee directed that $453 million in funds requested for SDI, and $34 million in related Department of Energy funds, be used to boost conventional capabilities.

The committee wants "to strengthen both the defense technology base and research on advanced conventional warfare technologies, with the goal of 'leapfrogging' current quantitative imbalances and the narrowing qualitative advantages of current fielded equipment."

The report says the committee intends "to encourage balanced technology development efforts across-the-board in areas such as armor/anti-armor initiatives; defenses against armed helicopters; hypervelocity missiles for ground combat use; defense against anti-ship missiles, including those with 'stealth' characteristics; 'smart' mines for both land and ocean warfare; lightweight, air transportable vehicles with anti-armor capabilities for rapid transport to remote areas; improved conventional anti-submarine warfare munitions; and 'smart' standoff munitions and submunitions for aircraft delivery outside of lethal air defense ranges."

The report says the committee "recognizes that technology alone cannot constitute a solution to conventional force imbalances," and that continued production of major weapons is important. It also says, however, that "unless our technology development efforts for conventional forces are enhanced, a serious imbalance between NATO and the Warsaw Pact will continue for the foreseeable future."

The under secretary of defense for research and engineering is to determine how the money for conventional forces is spent, and the committee wants a report from the Pentagon detailing the programs selected, their previous and enhanced funding levels, "and a set of major milestones and dates against which the Congress will be able to measure progress..."

The committee report also notes "the seriousness of the Soviet tactical ballistic missile threat," and says it "has identified up to $50 million within the SDI program" to accelerate work on an ATBM system. Full scale engineering development would be in fiscal 1988 and deployment would be in the early 1990s. The effort should be carried out with allies "on a matching fund basis with substantial contributions" from abroad. "Before more than 25% of these funds are expended, a memorandum of understanding or other formal agreement...should be executed," the report says.

DEFENSE WEEK 14 July 1986 Pg. 3

Officials Fear SDI Target of Terrorists

There is increasing concern that terrorists will strike against individuals associated with the Strategic Defense Initiative, a Pentagon official told *Defense Week*.

Last week, a bomb reportedly planted by Red Army terrorists exploded and killed Karl Heinz Beckhurts, a member of the managing board of Siemens AG, West Germany's top electronics group, and his driver. A note found near the blast site said Beckhurts had been killed because he was negotiating SDI contracts for Siemens.

But a company spokesman said Siemens has made no proposals to the Pentagon involving SDI research. An official with the Pentagon's SDI Organization confirmed that.

Nonetheless, U.S. officials have reason to believe their high-profile travels on behalf of the SDI may be dangerous. "Our intelligence tells us that those people associated with the SDI are high priority targets and are high risks when they travel," one Pentagon official said. He declined to elaborate on what precautions are being taken to minimize the risk.

But another Pentagon official said he had received "the standard briefing." He said he was told "to be careful and don't be a target."

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TARGET...Continued

Meanwhile, SDIO announced a contract with the West German firm of Messerschmitt Bolkow-Blohm that could be worth more than $35 million if all options are exercised. The contract calls for MBB to carry out experiments in space under the Infrared Background Signature Survey. Using the free-flying shuttle pallet satellite (SPAS), scientists hope to gather data on the how infrared detection gear can be used against the earth's background.

NEW YORK TIMES 17 July 1986 Pg. 21

G.A.O. Says 2 Missile Defense Projects Were Cut to Meet Deadline

By CHARLES MOHR
Special to The New York Times

WASHINGTON, July 16 — The cost of a major experiment in the program to seek a defense against nuclear missiles was underestimated by 20 percent, the General Accounting Office said today. As a result, an important element of the experiment had to be eliminated.

It appears to be the first documented and publicly acknowledged case of cost underestimating in President Reagan's Strategic Defense Initiative. But such problems are common in other weapon projects, and one Pentagon official predicted that it would be "the first of many" for the program.

The Defense Department dealt with the problem by curtailing experimentation on advanced sensor devices meant to distinguish between nuclear warheads and deceptive decoys in space, according to a report by the accounting office, which is an investigative arm of Congress.

The accounting office said the cost of an experimental airplane carrying a heat-detecting telescope and computer equipment to detect warheads in flight

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WASHINGTON TIMES
16 July 1986 Pg.1

Soviet proposal on arms aims at SDI, Perle says

By Warren Strobel
THE WASHINGTON TIMES

The Soviet Union's latest arms control offer won't be accepted as is, a senior administration official said yesterday, because it's merely another attempt to quash President Reagan's Strategic Defense Initiative.

"I think that's their goal," said Assistant Defense Secretary Richard N. Perle. "But we're not going to let it happen."

Mr. Perle told a Capitol Hill seminar sponsored by the Fund for an American Renaissance, a conservative research group, that the Soviet offer proposing trading deep cuts in long-range nuclear missiles for a 15- to 20-year ban on deploying missile defenses would place "severe constraints on the SDI program" and probably cause it to be abandoned.

Rep. Jack Kemp, New York Republican and chairman of the Fund, praised President Reagan for declaring in his weekly radio address Saturday that SDI — also called "star wars" — would not be negotiated at Geneva.

"We must not only research and test and develop SDI, we must mobilize a great national commitment to deploy SDI at the earliest possible date — and that position must never be bargained away," said Mr. Kemp.

The president's statement Saturday followed reports of a Cabinet-level battle over whether SDI should be sacrificed in hopes of achieving the administration's long hoped-for goal of reducing the Soviet Union's huge inventory of accurate offensive nuclear missiles.

Several panel members argued strongly against using SDI as a bargaining chip to get an arms-control agreement.

"In my view, it's a repeat of their earlier attempt to kill our technology, in this case SDI technology," said Seymour Weiss, a defense expert and former State Department official.

Delivered to Mr. Reagan last month, the Soviet proposal would extend the 1972 Anti-Ballistic Missile Treaty — which bans deployment of, and some research on, missile defenses such as SDI — for at least 15 years.

"That is not adequate [for the United States] to develop a defensive system and they know it," Mr. Weiss said.

Mr. Perle argued yesterday that that advantage — and the failure of arms control agreements to constrain Soviet behavior — is reason enough to build SDI.

"It seems to me that we ought to compete where we are strong [in defenses], not where we are weak," Mr. Perle said. He said the nation should not allow the Soviets to "define the playing field."

He accused the Soviets of "hypocrisy" for trying to delay the U.S. missile defense program while working on one of their own.

"The Soviets have in place a partial defense," Mr. Perle said. "The difference is the Soviets have been at it longer, they have invested more. The Soviets are way ahead."

In a report to Congress in April, Air Force officials said that in 20 key areas of strategic defense research, the United States was ahead in 14 and the two superpowers were roughly equal in six.

But Mr. Perle said that the Soviets have gone much further than this nation in turning such basic technologies into an operating missile defense.

"Where it's been devoted to the deployment of defensive weapons systems, they're ahead of us," he said.

Mr. Perle compared the decision to deploy SDI with former President Truman's decision to build the hydrogen bomb.

Robert Oppenheimer, a lead physicist on the Manhattan Project, which developed the atomic bombs that were used on Hiroshima and Nagasaki to end World War II, argued against building the H-bomb, saying it would spur the Soviets to do the same. His colleague, Edward Teller, argued in favor, saying the Soviets would build a hydrogen bomb whether the United States did or not.

"We now know, thanks to a courageous Soviet physicist — Andrei Sakharov — that even as Harry Truman was deliberating on that question, the Soviets were developing their own hydrogen bomb," Mr. Perle said.

If Mr. Truman had decided against building the bomb, "the world would be a very different place today," he said. "I believe we stand at a very similar historical juncture. Because the Soviets will continue to develop their strategic defenses whether we do or not."

G.A.O....Continued

had increased by $103 million in one year. A different experiment, involving radar equipment that can build an image of objects in space, was technologically cut back because the Pentagon sought to keep to its original schedule after Congress reduced money for the project, the G.A.O. said.

Deadline Termed 'Unrealistic'

Three Democratic Senators who requested the accounting office investigation said the quality of the experiments "has been seriously impaired so Pentagon planners can meet an arbitrary and unrealistic deadline."

The Senators, Lawton Chiles of Florida, J. Bennett Johnston of Louisiana and William Proxmire of Wisconsin, were referring to the Reagan Administration's goal of conducting research for the program in a way that a decision on whether to develop and deploy an antimissile defense can be made in the early 1990's. They and other critics of the program say antimissile technology experiments should be conducted at what they see as a more prudent pace.

One of the experiments investigated by the G.A.O. is the airborne optical adjunct. The Pentagon calls the system an "adjunct" because a 1972 treaty with the Soviet Union forbids most testing of antimissile "components."

The experiment will use a modified Boeing 767 jet transport with a cupola on its roof that was to have contained two experimental heat-detecting telescopes, one designed by the Hughes Aircraft Company and the other by Aerojet Electro Systems. The aircraft was also to contain signal and data processing computers to process the information obtained by the optical sensor.

The idea is that the infrared detecting device on the aircraft would be able to discriminate between actual nuclear warheads and decoys and other deceptive devices flying with the warheads. Passed to ground interceptor rockets, the data would help guide the inteceptors to the right targets.

The $524 million contract was awarded to Boeing Aerospace in July 1984 and was to be completed by late 1989. Last July Boeing informed the Army Strategic Defense Command that the experiment would cost $103 million more than provided for in the contract. The Army Strategic Defense Command manages the program for the Strategic Defense Initiative Organization, the agency responsible for managing the antimissile research.

The G.A.O. reported that the project officer who manages the experiment said, "The only way to significantly reduce the program's cost was to eliminate one of the two sensors."

The Aerojet sensor was eliminated, even though it was regarded as more sophisticated than the Hughes sensor and likely to have better capability. This was done, the report said, because the technology used by the Hughes sensor was "less risky." The three Senators said an inferior sensor was chosen to avoid a change in the deadline of 1992 or earlier on whether to proceed with the program.

Ground-Based Radar Plan

A similar problem arose with an experiment involving a ground-based radar that also tracks warheads, when Congress cut the program's budget last year. Lieut. Gen. James A. Abrahamson, director of the Strategic Defense Initiative Organization, was permitted to decide how the budget cuts would be applied, and he cut the terminal imaging radar program from $49 million to $29 million.

"The Strategic Defense Initiative Organization directed the Army not to slip the schedule because such a slip would impact the planned early 1990's decision on whether to develop and deploy a ballistic missile defense system," the G.A.O. report said.

To achieve this cut, it said, the Army "reduced or dropped some of the technical performance requirements" of the ground-based imaging radars being designed by two companies.

The G.A.O. report quoted the project manager as saying the reduction in the airborne optical experiment posed a number of problems, including a loss of competition and "no backup sensor if Hughes's design does not work."

The accounting office report said that the Army's own estimates of the cost of the airborne experiment ranged from 15 percent to 29 percent higher than the Boeing bid, but that the bid was accepted anyway.

The report said Boeing's offer flowed in part "because of the pressure to bid low created by the competitive environment." A contractor sometimes bids low in anticipation that contract adjustments will be made later.

NEW YORK TIMES 18 July 1986 Pg. 5

JAPAN SET TO JOIN 'STAR WARS' PLAN

General Agreement Reported on Private-Research Role

By CLYDE HABERMAN
Special to The New York Times

TOKYO, July 17 — Japan has decided in principle to join the Reagan Administration's space-based defense research, a senior Government official said today.

The official said there was general agreement among Japanese leaders to permit private companies and research institutes to take part in the missile-defense program, which is officially called the Strategic Defense Initiative and is popularly known as "Star Wars."

But the Japanese official added that divisions remained over whether Government agencies should also become involved, and that has delayed a final decision on Japan's role.

Nevertheless, several officials said discussions were in the final stage. A key Cabinet member in these talks, Michio Watanabe, the Trade Minister, told foreign reporters today that a decision would be reached "in a relatively short period of time."

The pace of Japanese deliberations is expected to quicken as a result of the ruling Liberal Democratic Party's victory in parliamentary elections last week. At least for now, the landslide has greatly strengthened Prime Minister Yasuhiro Nakasone, who has not officially endorsed the "Star Wars" program but is widely known to be a supporter.

Mr. Nakasone is also believed to have grown impatient with the slow pace of Japan's deliberations, which have dragged on for more than a year, and he is especially eager that a decision be made before his term expires in October.

Under present rules, he must step down then as party leader, although that deadline seems increasingly unimportant.

In the wake of the election results last week, momentum has gathered within the party to keep Mr. Nakasone in office. An extra full term of two years is improbable, political analysts said. But a growing number of Liberal Democrats, including Mr. Nakasone's chief rivals, seem inclined to extend his present term by at least a few months.

"Changing course would mean a betrayal of the public," the Chief Cabinet Secretary, Masaharu Gotoda, said.

Although United States officials have insisted that Japanese involvement is not critical for the space defense project to succeed, they hope to benefit from Japan's advances in electronics, lasers and rocket propulsion. In turn, after showing initial coolness, Japanese industry has steadily grown more eager to join the research, largely out of concern about falling behind in developing technologies.

SATELLITE REPORTEDLY EXPLODES, FALLING TO EARTH

OW141345 Tokyo JIJI in English 1322 GMT 14 Jul 86

[Text] Tokushima, July 14 (JIJI PRESS) -- A Soviet satellite presumed to be carrying a nuclear reactor has exploded in space and the debris is feared to be falling toward earth, according to LAT, a Japanese amateur space research group.

The group said 21 fragments of the satellite Cosmos 1736, which was launched on March 21, have been observed since June 26, possibly the result of an explosion of rocket fuel or the nuclear power reactor. One of the fragments is expected to reach the atmosphere within a month and could fall to earth between 65 degrees north and (?65) degrees south latitude, the group said.

The LAT (low-altitude artificial satellite tracking station) is a 25-member amateur group specialized in space satellite tracking based on data provided by the U.S. National Aeronautics and Space Administration, the British Defense Ministry and other organizations.

JANE'S DEFENCE WEEKLY 19 July 1986 Pg. 43

SDI compromise possible, says Mitterrand

By Jim Wolf in Paris

PRESIDENT Francois Mitterrand of France, back from visits to the Soviet Union and the USA, has indicated that a compromise on SDI research may be possible.

M Mitterrand identified the Strategic Defence Initiative as "the major obstacle" in nuclear arms negotiations and a stumbling block to another superpower summit.

But he referred to the possibility of a compromise between Washington and Moscow on the extent of allowable research on a space-based missile shield.

M Mitterrand said he remained confident that another meeting would be held between US President Ronald Reagan and Mikail Gorbachev, the Soviet leader.

A Soviet Foreign Ministry spokesman, Genadi Gerasimov, twice during the visit voiced a conciliatory statement about France's strike force.

"The Soviet Union fully respects the right of France to be free to decide its own nuclear force," he said.

CHEMICAL & ENGINEERING NEWS 21 July 1986 Pg. 18

Scientific debate over SDI intensifies

The battle to capture the hearts and minds of scientists in the cause of the Administration's program to explore the possibility of rendering nuclear weapons, in President Reagan's words, "impotent and obsolete," is showing no signs of abating. Petitions both for and against the program, officially known as the Strategic Defense Initiative (SDI), continue to circulate within the scientific community. They continue to be signed. And there is a proliferation of polls that purport to identify what scientists really think of the idea of trying to develop a weapons system to defend the population of the U.S. and its allies against ballistic nuclear missiles.

What all the furor really means and what impact it may have are impossible to fully define at this time. The SDI program continues to grow very rapidly. It is already the Department of Defense's largest single R&D effort. The department is requesting $4.8 billion for it for fiscal 1987. DOD will get less, probably about $3.8 billion. But even that will represent about a 35% increase over the $2.8 billion for fiscal 1986. In addition, the proposed 1987 budget for the Department of Energy contains about $600 million for SDI-related activities.

But one thing is very clear. The SDI program has generated more public response from the scientific community than has any other defense-related issue since the great debate over antiballistic missile defense of the 1960s. As before, the new debate is being spearheaded by physicists. But chemists, too, are showing considerable interest and visibility.

The most direct challenge to SDI has come from a pledge of nonparticipation that has been circulated quite widely throughout academic research departments. It calls on those who sign to neither solicit nor accept SDI funds to support their research. According to the petition's organizers, 3700 science and engineering professors and senior researchers have signed the boycott so far, including 57% of the combined faculties of the top 20 physics departments in the country.

The petition has been less widely distributed among chemistry departments. But data presented by the organizers indicate that 48% of the combined faculties of 21 major chemistry departments have signed. At 10 of those departments at least half of the faculty signed. Distinguished chemists who support the

CONTINUED NEXT PAGE

DEBATE...Continued

pledge include Nobel Laureate Roald Hoffmann of Cornell University, 1987 Priestley Medalist John D. Roberts of California Institute of Technology, Harry B. Gray also of Caltech, and Kurt M. Mislow of Princeton University.

This petition has been a grass-roots effort, triggered by physicists at Cornell University and the University of Illinois, Urbana-Champaign. It claims that the SDI program is "ill-conceived and dangerous" and that it "represents not an advance toward genuine security, but rather a major step backwards." And the petition expresses concern that "the likelihood that SDI funding will restrict academic freedom and blur the distinction between classified and unclassified research is greater than for other sources of funding."

Some of those who have a more kindly view of SDI are trying to counter the considerable publicity generated by the boycott by forming an organization of their own. It is called the Science & Engineering Committee for a Secure World. One of its purposes is to "correct the growing public misconception that virtually all scientists and engineers oppose SDI."

It has been founded by a group of 80 scientists and engineers including seven identified as chemists or chemical engineers. The committee's chairman is Frederick Seitz, former president of the National Academy of Sciences. Other distinguished members include Alvin Weinberg, former director of Oak Ridge National Laboratory; and Harold Agnew, former director of Los Alamos National Laboratory.

In an obvious swipe at those who have signed the boycott, the initial statement of the new group says that "as professionals trained in scientific methodology, we believe that the feasibility of a promising scientific or technical proposal should not be judged in advance of proper research, experimentation, and testing. Therefore, we believe that SDI should not be hastily, unscientifically, or ideologically rejected without this necessary thorough evaluation to determine its feasibility, its effectiveness, and its practicality—which is the very purpose of the SDI program."

A further petition is being circulated among government and industrial laboratories. It is another grass-roots effort, designed to give nonacademic scientists a chance to take a position. It calls for a curb on SDI funding, without committing those who sign to refuse to work on projects supported by such funding. So far the petition has been signed by about 1600 scientists and engineers, including some in the laboratories of Rohm & Haas, Du Pont, Procter & Gamble, Eastman Kodak, and IBM. This effort was initiated by scientists at AT&T Bell Laboratories.

That petition, which is in the form of an open letter to Congress, protests that "recent statements from the Administration give the erroneous impression that there is virtually unanimous support for [SDI] from the scientific and technical community." It also expresses concern that SDI "has grown into a major program without the technical and policy scrutiny appropriate to an undertaking of this magnitude." It urges Congress "to limit SDI to a scale appropriate to exploratory research."

The latest of a series of polls on SDI was sponsored by the Union of Concerned Scientists. It garners the views of a sample of 549 randomly selected members of the American Physical Society. By a margin of 54% to 29%, they see SDI as a step in the wrong direction for U.S. national security policy. And for those who claim to know a lot about the subject, the margin is even greater—63% to 25%.

That low opinion of SDI apparently does not stem from any anti-defense bias within the sample. Those polled expressed support for other major weapons programs initiated or continued by President Reagan. Those programs include the Midgetman missile, the Stealth bomber, the cruise missile, and the new generation of missile submarines.

Michael Heylin, Washington

AEROSPACE DAILY 21 July 1986 Pg. 106

BERT AND BEAR: Air Force Weapons Laboratory, Albuquerque, N.M., plans to launch a small neutral particle beam device into the upper atmosphere in December 1987. The Strategic Defense Initiative experiment will be launched on an Aries sounding rocket from White Sands Missile Range, N.M., to help determine atmospheric effects on a low-energy beam, an Air Force spokesman said. The program, called BEAR (Beam Experiments Aboard Rockets), is a continuation of the Beam Emission Rocket Test (BERT) program at the Air Force's Geophysics Laboratory, Hanscom AFB, Mass. The latter program focused on plasma experiments using electron gun accelerators.

DEFENSE NEWS 21 July 1986 Pg. 31

Senators Say 'Arbitrary' Deadline Causing SDI Project Concessions

By TRISH GILMARTIN
Defense News Staff Writer

WASHINGTON — Experiments to test two key sensor projects of the Strategic Defense Initiative (SDI) are being compromised so that the Pentagon can meet "an arbitrary and unrealistic deadline," according to three senators.

In a statement last Wednesday, Sens. Lawton Chiles (D-Fla.), J. Bennett Johnston (D-La.) and William Proxmire (D-Wis.), maintain that the projects have been reduced in scope so they can be finished in time to meet the Reagan administration's deadline for making a decision in the early 1990s about whether to develop and deploy a strategic defense system.

The lawmakers base their charges on a report, "Strategic Defense Initiative Program: Status of Airborne Optical Adjunct and Terminal Imaging Radar," prepared for them by Frank C. Conahan of the General Accounting Office. An unclassified version of the report was released by the senators last Wednesday.

The study traces the restructuring of the Airborne Optical Adjunct (AOA) and the so-called Terminal Imaging Radar (TIR) projects. The AOA experiment involves a Boeing 767 aircraft fitted with an optical sensor with a signal processor, data processor and other components designed to track enemy warheads. TIR is a ground-based radar that also tracks warheads.

Requirements that were eliminated from these experiments will have to be included in subsequent efforts, thereby increasing the technical risks of full-scale development, the report says.

Past experience has shown that deferring the resolution of technology issues to later development phases "can be more costly in both time and money." The study concludes that restructuring these programs "will result in less hardware and test results" on which to base a future development decision.

The two projects are designed to demonstrate that technology is available to develop effective sensors for a terminal phase ballistic missile defense system. The goal of the SDI is to develop technologies needed for a multi-layered defense that could destroy a ballistic missile during any of its four phases of flight — boost, post-boost, mid-course and terminal. The terminal phase begins when the warheads reenter the atmosphere and ends when they detonate at their targets.

The senators say the quality of the AOA project has been compromised so SDI can accommodate a $100 million cost overrun and still meet the early 1990s deadline.

Managers of the TIR project, they say, have "chosen to forego more promising technology" in order to have test results available for the early 1990s decision.

The report notes that officials with the Army Strategic Defense Command and the Pentagon's SDI organization believe the experiments "will still provide adequate information for the decision." The Army Strategic Defense Command in Huntsville, Ala., manages both SDI projects.

Boeing Aerospace was awarded the AOA experiment contract in July 1984. It was to cover a five-year period and included the development of two different optical sensors and the data processing hardware and software. The experiment was to cost $416 million.

The Seattle, Wash., firm subcontracted work for the development of the sensors to Hughes Aircraft Co. and Aerojet Electro Systems; it chose Honeywell Inc. to develop the data processing hardware and software. The basic purpose of the development effort is to resolve a host of technical issues associated with an airborne optical sensor.

One year later, Boeing disclosed a potential contract cost overrun of about $103 million. The AOA project was subsequently restructured and development of the Aerojet sensor was canceled. The Army decided to continue with only the Hughes sensor "because it was less risky," the report says. Total estimated cost of the experiment was increased to $524 million, an increase of $108 million.

The TIR experiment project is intended to demonstrate the capability to correctly identify reentry vehicles in time for interceptor missiles to destroy them before significant damage is done. The ground-based TIR radar will receive data from the AOA, acquire and track targets, discriminate between threatening and non-threatening objects and provide information to help interceptor missiles find and destroy reentry vehicles. Reentry vehicles are the containers that carry nuclear warheads.

Contracts for preliminary design work on the radar experiment were let by the Army in June 1985 to Westinghouse and Raytheon. The service exercised options for detailed design of the radar in December 1985. Present plans call for the Army to select one of the two contractors to build the radar hardware and conduct the experiment at Kwajalein Missile Range in the early 1990s.

This experiment was restructured because the SDI organization reduced the Army's funding for 1986, the report says. The service requested some $49 million for 1986 but received about $29 million.

WASHINGTON POST 22 July 1986 Pg. 1

Pentagon May Discard ASAT System

By Walter Pincus
Washington Post Staff Writer

The Defense Department is likely to scrap its controversial, F15-launched antisatellite (ASAT) system if Congress votes to continue a ban on tests of the weapon against a target in space, Pentagon and congressional sources said yesterday.

Dubbed "the flying tomato can" and designed to be fired into space from a high-flying F15 fighter, the Air Force ASAT missile has been plagued by technical problems during much of its eight-year history. The Pentagon already has cut the number of ASAT bases from two to one, and reduced the number of missiles it planned to buy by two-thirds.

Pentagon officials, who now describe the troubled system as only the "first phase" of a broader ASAT program, said they will focus more on promising antisatellite technologies that are being developed as part of President Reagan's Strategic Defense Initiative research.

The demise of the F15-launched ASAT and a return by the United States to a program that is purely research would come as the Soviet Union is seeking a ban on all antisatellite systems as part of Moscow's latest offer on space weapons in the Geneva arms talks.

Until now, the Reagan administration has pushed the F15-launched missile on grounds that the Soviets already have an operational ASAT and the United States does not. Washington also argued against negotiating a ban on all types of antisatellite systems because such an agreement could not be verified.

Last year, Congress adopted restrictions which prohibit the Air Force from testing the current ASAT against a target in space, unless the Soviets undertake such a test. Consequently, the next two tests of the system, now scheduled for August and September, will target the radiant energy from a star, which is permitted by the congressional ban.

The congressional restrictions are expected to be renewed for the fiscal year beginning Oct. 1, and that would undercut Air Force plans for three tests against orbiting targets now scheduled for fiscal 1987."Without those tests," a Pentagon official said, "there can be no confidence in proceeding with the system."

Last September, the Air Force ASAT successfully destroyed an obsolete satellite, but that is not considered sufficient by the Pentagon to persuade Congress to finance full production of the weapon, a military source said.

The House Armed Services Committee has deleted all procurement money sought by the Pentagon for fiscal 1987 and slashed the requested research funds. The full House is expected to add the testing restrictions. The Senate Armed Services Committee has agreed to the funds and to allow testing, but Rep. Les Aspin (D-Wis.), chairman of the House panel, is expected to hold firm when the testing issue reaches a conference committee since he is under fire from fellow Democrats for failing to support their positions on other issues.

Because of the restrictions now in force, the Air Force already dropped plans for two ASAT tests this year against an instrumented orbiting target launched last November. The $20 million space vehicle, which has two targets, is still in orbit.

Only one of the tests now planned against a star was part of the original test program. The other was added to gather additional data on the missile's infrared sensors, according to testimony given Congress earlier this year.

"Without targets," one Air Force official said recently, "there is only so much data of value that can be obtained."

In an April 26 letter, the Pentagon's undersecretary for research and engineering, Donald A. Hicks, described the F15-launched weapon as "only the first phase of a broader [antisatellite] capability" being studied. He said the Pentagon had "restructured the [antisatellite] program in January 1986 into two phases in recognition of the evolutionary nature of the threat, previous congressional actions and potential complementary systems."

The president's SDI, the so-called "Star Wars" research program, includes study of several laser and "kinetic kill" systems that possibly could be used against Soviet satellites as well as ballistic missile warheads.

Hicks' letter was included as part of a General Accounting Office (GAO) investigation of the F15-launched system that was sent to Congress June 11. The GAO criticized the program's cost growth, testing program, schedule delays and limited capability.

After the January review, the Pentagon cut planned production of the antisatellite missile from 112 to 35. The restructured program would cost $3.9 billion, slightly less than the $4.1 billion projected little more than a year ago for three times as many missiles, according to Aspin and Rep. George E. Brown Jr. (D-Calif.), two leading congressional critics of the program.

Originally, the Pentagon planned to base F15 antisatellite squadrons at McCord Air Force Base in Washington, and Langley Air Force Base, Va., in order to be able to attack Soviet satellites from two differents points. With only one base, however, the area of coverage would be limited.

The GAO also said the testing program, as proposed by the Air Force, is not challenging enough. The instrumented targets and outdated U.S. satellites that the Air Force will use if congressional restrictions are listed have different characteristics than Soviet satellites, according to the GAO. The Air Force Operational Test and Evaluation Center (AFOTEC), according to the GAO, said the instrumented targets "may be of limited value in projecting the system's performance in an operational environment."

The GAO also said that AFOTEC believes a "minimum of 15 flight tests is necessary to establish the system's capability," whereas only 12 are planned. The system's Air Force program office, however, did not agree, the GAO said.

WASHINGTON POST 22 July 1986 Pg. 15

Weinberger Warns Against SDI Trade-Off

By Lou Cannon
Washington Post Staff Writer

Defense Secretary Caspar W. Weinberger said yesterday that it would be a mistake for the Reagan administration to rush into a new arms control agreement and that limiting the Strategic Defensive Initiative (SDI) in exchange for Soviet cuts in offensive nuclear weapons would be a "bad bargain."

Weinberger said he believes "that the Soviets want and need an arms reduction agreement." He said the Reagan administration should not behave as if "speed or just signing a piece of paper is the important thing. It's more important than ever that we pay attention to the content of the agreement rather that just having the process drive an agreement."

Weinberger's warnings came during a Pentagon interview with six Washington journalists which he used as a forum to oppose what some have called the "grand compromise" of trading substantial reductions in the superpowers' nuclear arsenals for a delay in the deployment of any U.S. missile defense system.

The Soviets have proposed deep cuts in strategic nuclear arms in return for a U.S. promise of continued adherence to the 1972 Antiballistic Missile (ABM) Treaty for another 15 to 20 years. President Reagan will respond to Soviet leader Mikhail Gorbachev in a letter that U.S. officials said will be sent within the next few days.

Senior officials said over the weekend that Reagan would offer to negotiate on all aspects of arms control. They said Reagan would reaffirm the U.S. intention to continue with research on a missile defense system under SDI but would be willing to discuss limitations on deployment, with some favoring five or six years as a U.S. counterproposal.

Weinberger declined to directly oppose such a counteroffer, which officials said has been favored by Secretary of State George P. Shultz. But when asked repeatedly whether a delay in deployment would be negotiable, Weinberger implied that he was unwilling to make such concessions.

"Anything that gives up strategic defense would not be worth it," Weinberger said. "It would be undesirable in every way."

Even without a new agreement, U.S. officials have told Congress, it would be at least six years before a missile defense could be developed and that deployment would take several additional years. As orginally proposed, the plan called for a defensive system to be deployed in stages, with the first stage intended to defend existing U.S. missile sites.

But Reagan has embraced the more ambitious idea of a defense he has called "my dream" of an antimissile shield that he says could protect the entire U.S. population. Supporting this concept in April testimony recently released by the House Appropriations Committee, Weinberger said that those who favored a defense that would protect only missile sites "don't understand the system and have not gotten the word."

Weinberger yesterday criticized the ABM Treaty, which was signed by President Richard M. Nixon, for abandoning the concept of strategic defense. Anything that would exchange "a promise as hopeful as strategic defense" for a Soviet promise to reduce its offensive arsenal is "a bad bargain for the world," he said.

The draft of the letter to Gorbachev was worked out during the past several weeks by a top-level group consisting of Reagan and his most senior foreign policy and defense advisers, according to a senior official. The top-level meetings, known only to a few people, supplanted the Senior Arms Control Group (SAC-G) which is normally the battleground for interagency debates over arms policy.

Weinberger, Shultz, White House Chief of Staff Donald T. Regan, national security affairs adviser John M. Poindexter, Director Kenneth L. Adelman of the Arms Control and Disarmament Agency and Adm. William J. Crowe Jr., chairman of the Joint Chiefs of Staff, were among participants in the meetings.

Special advisers Paul H. Nitze and Edward L. Rowny were dispatched last weekend to consult U.S. allies in Europe and Asia, respectively, about the U.S. letter. In addition, H. Allen Holmes, the State Department director of politico-military affairs, was sent to Europe to chair a special meeting of a NATO group dealing largely with policy toward intermediate-range missiles.

The report of these emissaries is expected by late this week, and officials said that Reagan's reply to Gorbachev could be on its way as early as next week.

Staff writers Don Oberdorfer and Walter Pincus contributed to this report.

NEW YORK NEWS 23 July 1986 Pg. 8

4 estimates for Star Wars

THE ASSOCIATED PRESS

WASHINGTON — A full-blown Star Wars antimissile defense would cost between $670 billion and $770 billion to deploy and operate for 10 years—requiring the equivalent of a $570 increase in the average family's annual tax bill, a new study concludes.

The study, done by two Washington-based defense researchers, is believed the first to attempt a comprehensive analysis of the cost of what President Reagan calls his Strategic Defense Initiative. More popularly known as Star Wars, the system would develop lasers and other exotic weapons that could automatically shoot down nuclear missiles fired at the United States or its allies.

The study, by Barry Blechman and Victor Utgoff, was prepared for the Foreign Policy Institute of the Johns Hopkins University.

Pentagon spokesman Robert Sims dismissed any compilation of cost estimates.

"It is a real exercise in absurdity to try to estimate the cost of a system which hasn't been defined and which we're not ready to deploy yet," Sims said.

4 scenarios

Utgoff and Blechman said they had developed cost estimates for four different Star Wars systems by reviewing historical data on space vehicles, the results of scientific research to date and manufacturing projections.

The four range from a rudimentary ground-based system that would protect U.S. military installations and cost $160 billion to a full-blown ground and space-based system protecting the entire country that would feature either orbiting lasers or "battle satellites" with missiles and cost $670 billion to $770 billion.

Financing the biggest system envisioned "would require roughly an 11% increase in federal revenues from individual income taxes," the study adds.

"For the average family earning between $30,000 and $50,000 per year, this would mean an increase of about $570 per year in their tax bill. Alternatively, under the current tax code, the system could be financed by raising revenues from corporate income taxes by about 50%."

CBS Nightwatch

WUSA-TV
CBS Network

July 24, 1986 3:00 A.M.

Washington, D.C.

General Abrahamson Discusses SDI

CHARLIE ROSE: Few of President Reagan's decisions have stirred up more conversation than the one known as Star Wars. The Strategic Defense Initiative has attracted a wide range of criticism from both friends and foes of the United States. In this country, the debate over funding for the program rages on. Administration officials asked for nearly five billion dollars for SDI in the new budget, but it appears that request will be slashed by Congress.

Is the President's Strategic Defense Initiative at a critical crossroads?

CONTINUED NEXT PAGE

SDI...Continued

With us now, the director of the program, Lieutenant General James Abrahamson.

A pleasure to have you back. Thank you for coming.

LIEUTENANT GENERAL JAMES ABRAHAMSON: Good morning, Charlie.

ROSE: Let me -- you want to talk about funding. But you, since we talked a year ago, or so, have obviously been involved in the center of what you know. And this is an area in which there's increasing knowledge as you do more research. Looking at where you are today, when do you think you can begin deployment?

GENERAL ABRAHAMSON: I've testified in Congress that, depending, of course, on our progress and depending on our funding levels...

ROSE: Assuming funding levels of about 3.5 billion, or so, for this year and...

GENERAL ABRAHAMSON: ...that we believe that we could be in a position for a national decision somewhere in the early '90s. And if that were made positively, that, yes, you go into development somewhere after the mid-'90s, that you could begin a deployment.

ROSE: Mid-'90s. So about ten years from now.

GENERAL ABRAHAMSON: Yes.

ROSE: Yeah.

Does that mean that we ought to consider seriously foregoing deployment, in a sense, in exchange for sharp reduction in offensive weapons for the Soviet Union -- oh, say for the next ten years -- because, scientifically and technically, we're not going to be in a position to deploy?

GENERAL ABRAHAMSON: Well, obviously, that's a decision that the President must make. And I think the most important thing is that the President has continued to emphasize that we must continue to do research, just as the Russians are continuing to do research.

ROSE: There's no question that we will not continue to do research, is there?

GENERAL ABRAHAMSON: I don't believe so.

ROSE: Are the Soviets asking us not to research in their most recent proposal?

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SDI...Continued

GENERAL ABRAHAMSON: Well, their proposals had several aspects to it. One was a series of definitions which goes well beyond the ABM treaty in attempting to limit and control research.

ROSE: Looking at the deployment question, then. Let's assume that -- you talk about deployment. Sketch for us the stages that would take place between now, say, and 1995, 1996, the next ten years. How would you see that evolution?

GENERAL ABRAHAMSON: Well, I think we understand, of course, the research phase of the program best. There are a lot of decisions that would have to be made about the development and deployment stage. The most important one is the political decision, as well as the strategy decision, that says: Yes, we know enough and we have sufficient confidence that we can deploy a cost-effective kind of defense that will indeed meet the objectives that the President laid out.

So, it's that first difficult decision that we're aiming for. And what that means is we have a well-structured and carefully-laid-out program of research that will be showing more and more of its results as time goes on, so that people can meaningfully make and understand that decision in the early '90s.

ROSE: And research becomes development when?

GENERAL ABRAHAMSON: Well, after that decision. That's the key point. That one single decision is probably going to be one of the most complex ones that whatever Administration is in power, and the Congress, and even our allies, have to consider, because, of course, we're conducting that research within the limits of the treaty.

ROSE: When will you bang up against the treaty, the ABM treaty?

GENERAL ABRAHAMSON: Well, we design our experiments not to go up against the edge of the treaty. We design our experiments, by direction, to be within the treaty. And then we also design the experiments to get the maximum amount of information and confidence so that that decision can be made on a knowledgeable basis.

ROSE: Can you safely say that, looking at the research as it stands today and what you know, and knowing what the treaty says, that certainly between now and 1991 you will not bang up, go up against the tenets of that treaty, the provisions of that treaty?

GENERAL ABRAHAMSON: I think the key point is, as I indicated, is that we deliberately design the experiments not to.

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SDI...Continued

However, there will come a time where it's a natural thing to do. The logical next step would be to go beyond the treaty. And that is after this political decision, which is in the early 1990s.

Now, could we get there faster? Some of the experiments that have been proposed are around that 1990 time frame. But we're very...

ROSE: 1990...

GENERAL ABRAHAMSON: That's a very crucial time. And I think that's what everybody should be aware of. All of the experimental programs are laid out and kind of come together so that people will get that confidence in that time frame.

ROSE: What's most likely to violate the treaty? Is it the airborne optical, or what experiment would more likely do that?

GENERAL ABRAHAMSON: Well, none of our experiments would violate the treaty, again, because we've designed them that way. After that decision is made, then there is a logical point where a whole series of development tests will go beyond the treaty. But again, that's only after this national decision.

ROSE: Have you changed your definition of what strategic defense can do...

GENERAL ABRAHAMSON: No.

ROSE: ...since you have been involved?

GENERAL ABRAHAMSON: No.

ROSE: Is it at odds with what the President and the Secretary of Defense believes it can do?

GENERAL ABRAHAMSON: No.

ROSE: How would you characterize it?

GENERAL ABRAHAMSON: First of all, I'd say that we've got a false controversy going that has been picked up and emphasized, the controversy, in such a way that it sounds like it's either-or, that it's either the defense of military installations or the defense of people.

The President said from the very beginning: Let's see if a layered defense can be structured, one that will provide us sufficient confidence in effectiveness that we can defend the area of the nation as a whole.

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SDI...Continued

Obviously, if you can defend Washington City, you can also defend a military installation. It is not an either-or question. And that's why I think it's a false controversy.

Our objectives are exactly the same as they have been right from the very beginning. And, in fact, the progress of the program is such that we're gaining confidence that we can do this.

ROSE: Reasonable men differ and reasonable woman can differ on that, can they not?

GENERAL ABRAHAMSON: Sure.

ROSE: And Senator Nunn and Senator Cohen seem to differ on that.

GENERAL ABRAHAMSON: Well, I believe that there are some who would say, and we have always said, that this -- if there were a positive decision to go ahead, that the defense would not suddenly spring into being; it would come stage at a time and be developed slowly, and its capability would improve over time.

So, therefore, many of these questions are about which level of effectiveness and how should you start that particular effort. Should you start with terminal defense? We think that that's a wrong answer, that you should not start with terminal defense.

And, of course, when they say terminal defense, they mean terminal defense of missiles.

We think that it's much better to start with an area defense, which will provide light coverage of the United States. And we are also interested in being able to push very hard so that we can get coverage of our allies as well.

ROSE: Back in a moment. General Abrahamson.

* * *

ROSE: General Abrahamson, let me come back to the point, because you strongly feel that it is a false issue and an argument that doesn't even have to be made that there's some difference between, you know, an overall shield that will protect all of us, a kind of ultimate defensive system, verus one that, because of the technology, will only be used, or should only be used in the beginning to protect our missiles and prevent the consequences of a first strike.

Having said that, what do you mean by an area strategic system?

GENERAL ABRAHAMSON: We have always talked about

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SDI...Continued

defenses really being effective if they were layered defenses, so that the enemy on the other side, the man who is planning the strategic strike has to get through not just one layer, but several layers. If he has to only get through one layer, no matter where that layer is, if it's terminal or if it's up in space somewhere, then he can overwhelm it. He can build more missiles and overwhelm it.

On the other hand, if he has several layers that he must get through, he will never know which missile that goes through the first layer will also be the one that goes through the second layer. It introduces such uncertainty that, in fact, the motivation is to say, "We shouldn't build more missiles. Let's look for some other way to provide for our security."

It's because we're trying to, in fact, move to a different strategic regime, a different strategy, to move away from retaliation, to add defenses to deterrence, that we keep saying that that doesn't have to be an issue.

Therefore, you want several layers.

ROSE: Okay. But it seems to me that what you're saying is, again, that whe you talk in terms of area, you're engaging in -- and believe me, I'm a layman in this, and as you know, and it's so highly technological.

You are talking about, in a sense, using semantics to talk about protecting missiles and protecting the ultimate target of Soviet missiles.

GENERAL ABRAHAMSON: Well, I think that's not the case. An area defense could be an area of the United States, or an area in a theater, in Europe or in the Mideast, or even the Pacific.

Now, if you're able to be partially effective, let's say 50 percent effective, covering the United States, you've done something very, very impressive.

ROSE: But that's not...

GENERAL ABRAHAMSON: And then you start building up to 60 and 70 and 80 and higher levels of effectiveness by adding to more layers.

ROSE: Okay.

What kind of reduction in Soviet offensive weapons would, in your judgment, justify a delay in a U.S. development or deployment of SDI?

GENERAL ABRAHAMSON: Well, I don't think that's my responsibility to answer that kind of question. But let me say this: People forget that in the President's speech in March of 1983 he laid out three challenges. The first one was to develop

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SDI...Continued

a better strategy. A strategy doesn't mean anything without the means to implement it. So the second one was to develop the technology so that a defense could be implemented. That's the research program. The third one was a challenge to the arms control community to reduce the level of offensive weapons.

The program has been conducting research and has been making major efforts in all three of those areas from the very start. So many people keep trying to define this: it's either SDI or arms control. I think it's SDI and arms control.

ROSE: Well, what seems to have happened -- and all you've got to do is pick up the newspapers. And here, you see, this is the Washington Times: "Star Wars Imperiled by Treaty Push." This is a conservatieve newspaper in Washington. It most of the time supports the Administration. It says, "The State Department is preparing a recommendation that President Reagan agree to extend the 1972 anti-ballistic missile treaty five to seven years, in response to a Soviet proposal for a 15-to-20-year extension, government sources said yesterday. The proposal has sparked sharp criticism within the Reagan Administration because it raises doubts about the U.S. ability to complete the President's proposed Strategic Defense Initiative."

GENERAL ABRAHAMSON: And the President has said, repeatedly, that he doesn't want anything to interfere with the research phase of the program; and future decisions would then be made later about the next phase of the program.

ROSE: Does that mean that there is no way that SDI can be on the table in Geneva before any kind of grand compromise --i.e., a restriction on SDI in exchange for offensive weapons -- because research will not be tampered with in any way?

GENERAL ABRAHAMSON: Well, when you look at that particular trade, once again you've defined a very interesting trade.

Remember, there's another part of this. There is a reduction in offensive weapons that's being proposed and discussed on both sides. And when you talk about reducing the research program or trading it away on our side, you better also talk...

ROSE: Not research. Just deployment.

GENERAL ABRAHAMSON: Okay, deployment.

You better also talk about trading that away on the Soviet side, as well. And you better understand what is going on on the Soviet side of the research program.

Certainly the Soviets are very interested in, indeed, trying to structure this exactly the way you have put it. But that's a Soviet structure: trade this for this. I think what the American response to that ought to be -- and the President is

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SDI...Continued

determining that -- is one that would allow us to proceed with the research phase and then make a separate decision. And that's SDI and the arms control.

ROSE: That's the great political decision you have talked about in the early '90s.

ROSE: Is what the Soviets are worried about the fact that in the SDI research phase we, because of our technological advantage, are going to come up with some application to conventional warfare?

GENERAL ABRAHAMSON: Well, you have to ask the Soviets that, of course.

I honestly believe that, yes, they are concerned that what we are doing is we're pushing technology forward with a new drive, one that they have not seen before, and that that will have many benefits. Some of them will clearly be beyond strategic defense. And, obviously, that worries them as well.

ROSE: Hold that point. We'll be right back. General Abrahamson.

* * *

ROSE: Lieutenant General James Abrahamson is director of the SDI program. He formerly was director of the space shuttle program at NASA.

Staying with the idea of what the Soviets -- the context of what might be an agreement. How far along are they, in your judgment, on developing their own kinds of strategic defense programs?

GENERAL ABRAHAMSON: Well, remember, the first thing is they have maintained the world's only anti-ballistic missile defense.

ROSE: Around Moscow.

GENERAL ABRAHAMSON: The terminals are around Moscow. The interceptors are around Moscow. On the other hand, they have upgraded their entire radar system in a dramatic way. And, of course, one of those is a clear violation of the treaty, the Krasnoyarsk radar. So that puts them in a position, if they choose to exploit it, to rather rapidly begin to come out -- be able to come out from under the treaty. People need to consider that.

But they didn't stop there. They are conducting research in ground-based lasers, in neutral particle beams, in nearly every area that we are.

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SDI...Continued

It's hard to tell exactly where they are. In some areas we know they're ahead. For example, I have now operating out at Los Alamos Laboratory out in New Mexico an experimental version of a neutral particle beam weapon. The reason it works is because there are two Soviet inventions in it. It's a little technology transfer from East to West. But nonetheless, it means that they were there first, a long time ago.

ROSE: And you think whatever they're doing ought to be on the same table that whatever you're doing if there's going to be a negotiation that ought to parallel any reduction in offensive weapons.

GENERAL ABRAHAMSON: Yes. And I think that's why the President proposed earlier the open-laboratory approach.

ROSE: Can you tell us how, in what manner the Administration will propose some kind of exchange, in its response to the latest Soviet initiative, that involves SDI?

GENERAL ABRAHAMSON: No.

ROSE: Can you tell us if an SDI component will be in the American proposal?

GENERAL ABRAHAMSON: No.

ROSE: Has the decision been made?

GENERAL ABRAHAMSON: The President knows that. All of us are doing are very best to support the President in what is clearly a very, very important fundamental strategy effort.

ROSE: It seems that the Secretary of Defense is very concerned that that kind of deal might be made.

GENERAL ABRAHAMSON: We are doing our best to provide all the information so that the decision can be made properly.

ROSE: Are you worried that in the interest of a dramatic reduction, a grand compromise, that there might be a harmful restriction on SDI?

GENERAL ABRAHAMSON: Well, I think it's important that we lay out, so people can understand, what restrictions would be harmful and which are not.

ROSE: What would be harmful?

GENERAL ABRAHAMSON: Let me point out to you what I think is probably the most wonderful scenario we can ever have.

ROSE: Okay.

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SDI...Continued

GENERAL ABRAHAMSON: And that's one where instead of facing an increasing number of ballistic missiles that we all have to consider, both in a strategic defense and in a non-strategic defense environment in the future, that we begin to turn that around and we reduce the number. That makes it easier for strategic defense. Strategic defense takes away the value of even those remaining missiles. And you start on a cycle that's going down rather than that's going up.

Now, that's what's the real objective, I think, always has been, and should be.

ROSE: Is it likely to happen?

GENERAL ABRAHAMSON: Well, I think the important thing was, before SDI it wasn't happening. SDI has now been underway for several years, and it's beginning to happen.

ROSE: If the budget for SDI coming out of fiscal year '87 is 3.5 billion, will that cause you to dramatically reduce your effort?

GENERAL ABRAHAMSON: It'll have a fair -- it'll have a significant result. It'll clearly be a budget cut for planned programs over 25 percent. Remember, last year we had 25 percent, too.

ROSE: So it could upset the timetable for researcy, development and deployment.

GENERAL ABRAHAMSON: It will clearly have a delaying effect.

Obviously, we don't know what's going to come out yet. We are doing planning to try to minize the impact of that. And we'll do our very best with whatever resources the nation feels it can afford.

Most importantly, you should remember that even though there's a great controversy about this, the controversy is not whether or not we should do research. That's what it was in the early years. Now the controversy is, how much can the nation afford? That's healthier.

ROSE: Thank you very much for being with us, General Abrahamson.

GENERAL ABRAHAMSON: Thank you.

BALTIMORE SUN 26 July 1986 Pg. 1

U.S. offers Gorbachev SDI delay

Reagan responds to Soviet letter

From Wire Reports

WASHINGTON — President Reagan formally responded yesterday to Mikhail S. Gorbachev's most recent arms proposal with a plan that sources said offers to delay — but not to curtail — his "star wars" program.

The White House announced in a brief written statement that Mr. Reagan's long-awaited response had been sent but described it as "a private letter" to the Soviet leader and gave no indications of its contents.

Administration sources, speaking on condition they not be identified, said Mr. Reagan proposed to delay deployment of a nuclear weapons defense system for five to seven years in exchange for an agreement that such a system could be deployed by either or both superpowers after an agreed-upon date.

Administration officials also disclosed yesterday that a high-level Soviet official will hold talks in Washington starting this weekend, a move which they see as laying the groundwork for a superpower summit meeting later this year.

The officials said Soviet Deputy Foreign Minister Alexander Besmertnykh and his advisers would be holding wide-ranging talks with Secretary of State George P. Shultz and other officials.

Administration officials and scientists have said the president's Strategic Defense Initiative, as the "star wars" research program is formally known, is not expected to produce any deployable weapons for several years, if ever.

The president, speaking to a group of student leaders yesterday before leaving the White House for a weekend at Camp David, said he "would never let [SDI] become a bargaining chip in the sense of that if they would do something, we'd give it up and not go forward."

But, he added, "There are a lot of details that, at the moment, with negotiations to come and so forth, that I don't feel free to say."

Saying the United States remains committed to seeking significant reductions in offensive nuclear weapons, the White House statement added, in reference to SDI:

"We look upon the energetic research effort of our government toward finding a defense against these weapons of mass destruction to be an essential part of the task of reducing the effectiveness and the very need for these offensive weapons."

SDI envisions the use of futuristic technology, perhaps including super-powerful laser and particle beams, to shoot down incoming missiles before they can explode over their targets.

"The president is hopeful that the ideas he has put forward in this letter will continue the process of building a firm basis for progress in a number of critical areas," the White House statement said.

It added that Mr. Reagan "finds his exchange of correspondence with General Secretary Gorbachev to be of great value in the search for understanding between our two countries.

"We hope that our efforts will produce agreement, not only in arms control, but in the other important regional and bilateral issues that too often are sources of tensions between the United States and the Soviet Union."

Development of any nationwide defense system by either side now is prohibited by the 1972 Anti-Ballistic Missile Treaty. The United States has suggested it may unilaterally reinterpret certain provisions of the agreement to permit it to go forward with the SDI program or break out of the treaty altogether, which it can do by giving six months' notice of its intentions.

In an article carried in *The Sun*, *The New York Times* reported yesterday that a draft of Mr. Reagan's response offered the Soviets a choice of adhering to the existing ABM treaty – with the implicit threat that the United States might withdraw from it at any time – or agreeing to deployment of a defensive system as early as 1993.

Meanwhile, in Geneva, Switzerland, the United States and the Soviet Union began talks on nuclear-test issues yesterday that each claims to have initiated. Washington seeks verifiable compliance with treaties signed in 1974 and 1976 to limit the size of nuclear tests, and the Kremlin wants testing banned.

Both sides agreed to confidentiality in the talks, and the U.S. spokesman, Christopher Henze, would not disclose details.

In a terse joint statement last night, the delegations said talks covering "the entire scope of issues relating to nuclear testing" had begun, but gave no details.

WASHINGTON TIMES 29 July 1986 Pg. 4

'Star wars' funds said misused

The Pentagon's Strategic Defense Initiative Organization used money earmarked for "star wars" research for unauthorized projects such as air-conditioning office buildings and repairing roofs, according to a congressional audit released yesterday.

"We conclude that SDIO improperly charged its [research] accounts for expenditures that should have been charged against military construction funds," the General Accounting Office said in a 45-page audit.

"We also found that SDI research funds were used for operational support such as to repair a roof and to maintain facilities."

The Strategic Defense Initiative is a research program to develop lasers and other exotic weaponry that could be used to shoot down enemy nuclear missiles.

The GAO audit, dated July 24, focused on construction work in fiscal 1984 and 1985, early in the "star wars" program.

WASHINGTON TIMES 29 July 1986 Pg. 4

Proposed delay will doom SDI, retired general warns

By Warren Strobel
THE WASHINGTON TIMES

A key figure in President Reagan's decision to go ahead with the Strategic Defense Initiative said yesterday that delaying deployment of the proposed missile defense shield, as the president has offered in a letter to the Soviets, would spell the program's demise.

"You've lost all the horsepower behind the idea," said retired Lt. Gen. Daniel O. Graham. "You're stuck with the balance of terror ad nauseum."

The United States should deploy available defenses against nuclear weapons as soon as possible, not negotiate an extension of a treaty that bans such protection, said Mr. Graham, director of High Frontier. He briefed reporters yesterday.

High Frontier, a private organization, conducted a study early in the Reagan administration. It concluded that new technology has made defense against Soviet missiles feasible. The organization has pushed for deployment of a strategic defense system, which, it says, can be assembled quickly from existing technology with a minimum of engineering work.

In his reply to Soviet leader Mikhail Gorbachev's June arms control offer, Mr. Reagan on Friday reportedly proposed an increase in strategic defense research by both nations coupled with a five- to seven-year extension of the 1972 Anti-Ballistic Missile Treaty.

Such an extension would block SDI deployment and, some observers have argued, would destroy congressional interest in the program.

Mr. Gorbachev originally called for a 15- to 20-year extension of the ABM Treaty and a limit for each side of 8,000 nuclear warheads on intercontinental ballistic missiles and cruise missiles.

That proposal sparked an internal battle between administration hardliners, such as Defense Secretary Caspar Weinberger, and a second faction led by Secretary of State George Shultz. The latter group advocates a "grand compromise" in arms control, i.e., trading SDI for deep cuts in offensive nuclear weapons.

Mr. Shultz met with a senior Soviet official in Washington yesterday.

[Speaking from the Soviet Union, Mr. Gorbachev said that his response would hinge on U.S. willingness to compromise on SDI, known informally as the "starwars" program.]

The Soviet offer is a "huge red herring" designed to further the Soviet goal of curtailing the SDI program, Mr. Graham said.

His High Frontier organization advocates using available, "off-the-shelf" technology to build missile defenses, which would be supplemented later with exotic "star wars" technology.

Mr. Graham said SDI will be beset by threats as long as it remains a research program confined to the laboratory.

Mr. Graham said two defenses could be quickly deployed: one ground-based, one space-based.

Pentagon officials "are unwilling to screw the nerve up enough to say, 'Yeah, the ABM Treaty has to go,'" he said. "They really have to make a choice between SDI and the ABM Treaty ... I think they think they have to make it right now."

WASHINGTON TIMES 30 July 1986 Pg. 2

Reagan told extending ABM pact would endanger funds for SDI

By Walter Andrews
THE WASHINGTON TIMES

A group of House Republicans has warned President Reagan that his strategic missile defense program will not receive adequate funding if he accepts a five- to seven-year extension of the 1972 anti-ballistic missile treaty, congressional sources said yesterday.

The president, in a letter to Soviet leader Mikhail Gorbachev last week, offered the ABM treaty extension as part of a proposed arms control agreement.

The treaty, under the interpretation now used by the United States, bans deployment and advanced testing of the proposed Strategic Defense Initiative.

The 21 House Republicans, in a confidential letter to the president sent last Thursday, said the ABM treaty extension is "certain to lead members to conclude that the Strategic Defense Initiative has become a bargaining chip" in the Geneva arms talks.

"Under these circumstances, it [the SDI program] will never be adequately funded. Even the most ardent supporters of the SDI program here in Congress will question the program's future," the congressional letter said.

Currently, either side can withdraw from the ABM treaty with six months' notice.

"We believe that any proposal made to the Soviets should, to the degree we are bound by the ABM treaty, insist on the legally correct interpretation of the treaty, not the restrictive interpretation under which the [SDI] program cannot be completed," the letter said.

Last fall, the White House said the ABM treaty, correctly interpreted, would allow the testing of SDI components and subsystems.

Signers of the letter fear that the president's proposal to Mr. Gorbachev would lock the United States into abiding by the restrictive interpretation for another five to seven years, sources said.

The signers of the letter are: Reps. Jack Kemp of New York, chairman of the House Republican Conference; Bob Livingston of Louisiana, chairman of the Republican Study Committee; Robert K. Dornan, David Dreier, William E. Dannemeyer, Daniel E. Lundgren and Duncan Hunter, all of California; Don Burton of Indiana; Tom DeLay and Joe Barton of Texas.

Also, Pat Swindall and Newt Gingrich of Georgia; Mark Siljander of Michigan; Henry Hyde of Illinois; Toby Roth of Wisconsin; William Cobey of North Carolina; Bob McEwen of Ohio; Jim Ross Lightfoot of Iowa; Robert Walker of Pennsylvania; Bill McCollum of Florida, and Helen Delich Bentley of Maryland.

PHILADELPHIA INQUIRER

1 August 1986 Pg. 4

Key 'Star Wars' aide gets job in arms firm

Boston Globe

WASHINGTON — The chief scientist of the Reagan administration's Strategic Defense Initiative is quitting the Pentagon today to work for a military contractor that has SDI contracts.

The scientist, Gerald Yonas, will become vice president of the Titan Corp. in La Jolla, Calif., on Aug. 18. The company said Yonas would be "overseeing development of a number of highly promising electro-optical and high-energy systems operations."

Titan reported sales of $97 million last year, of which 70 percent were for military contracts. A company spokeswoman said Wednesday that Titan did $12 million of business on the SDI missile-defense project last year and is projected to earn $18 million to $20 million this year on the program — mainly for theoretical studies and developmental work on lasers and particle-beam weapons.

Titan president Gene Ray said Wednesday that Yonas would be leading the company's efforts to expand its high-technology products into commercial applications.

"Gerry will not be involved in our SDI work at all," Ray said.

Federal law forbids a person in a position such as Yonas' from representing corporate projects before Pentagon officials if he had previous experience working with the project while working for the government. Ray said in a telephone interview, "We adhere to that policy 100 percent."

Before coming to the SDI office, Yonas was with the Sandia National Laboratory, a major weapons lab in Albuquerque, N.M. In 1983, he served on the Fletcher panel, a government-appointed commission to examine the feasibility of a space-based missile-defense system.

FINANCIAL TIMES 1 August 1986 Pg. 3

Nato chief wants counter to shorter-range missiles

BY DAVID BUCHAN

NATO'S TOP military commander, General Bernard Rogers, has formally proposed a new system, drawing on Star Wars technology, to defend Western Europe against what he perceives to be a growing threat from shorter-range Soviet nuclear conventional missiles.

A planning guideline on tactical ballistic missile defence has been sent by General Rogers's SHAPE headquarters within the past week to the Nato Military Committee for endorsement. If endorsed it will still have to be approved by the alliance's defence ministers at their regular year-end meeting in December before it becomes a formal Nato programme.

Gen Rogers has argued that the threat posed by Soviet shorter range SS-21, SS-22 and SS-23 missiles, which have conventional and chemical capabilities as well as nuclear, has been lost sight of in the recent Western focus on the medium-range SS-20. Because of past political difficulties in deploying Pershing and cruise missiles in Europe, he does not believe that Nato could easily match further Soviet deployments of offensive missiles.

Instead, his headquarters is proposing an improved air defence system that could draw on some of the research into directed-energy weapons, such as electromagnetic rail guns, for the US Strategic Defence Initiative (Star Wars, so called). The recent award of a $10m contract by the US to the British Ministry of Defence to carry out an "architects study" on European missile defence could overlap with preparations for an anti-tactical ballistic missiles (ATBM) system which Gen Rogers is proposing.

Nato officials do not believe that such a system would in any way violate the US-Soviet anti-ballistic missile (ABM) treaty governing the super powers' intercontinental missile defences. There is in any case, some prospect that an ATBM system, whose main political support comes from West Germany, the most exposed ally on the central front, might become a European, rather than an all-Nato, programme.

ABC WORLD NEWS TONIGHT ABC-TV
6:30 P.M. AUGUST 5

SDI Funding

TOM JARRIEL: The Reagan Administration won a big victory in Congress today. By a one-vote margin, the Senate rejected a motion to cut spending on the Star Wars missile defense program by 40 percent next year.

The Administration says Star Wars has gotten the Kremlin to negotiate seriously about arms cuts.

NEWSWEEK 4 August 1986 Pg. 4

Star Wars Politics

Reading between the lines of Reagan's letter to Mikhail Gorbachev

AFP

Reassuring the allies: *Nitze with Italian Defense Minister Spadolini*

Ronald Reagan's implied willingness to extend U.S. adherence to the ABM treaty for at least five years—contained in his long-awaited letter to Soviet leader Mikhail Gorbachev last week—was driven more by congressional budget cutting than by the dictates of U.S.-Soviet diplomacy. In fact, senior U.S. officials say, Reagan conceded nothing to Moscow that he hadn't already expected to lose on Capitol Hill.

According to these sources, likely congressional cuts in the Strategic Defense Initiative (Star Wars) budget will slow down research on the missile-defense program a year to 18 months past the original timetable. That delay could make it 1991 or "thereabouts" before the United States would even be in a position to conduct tests that would violate the ABM treaty. At that point, there could be two additional years of compliance with the ABM accord if the Soviets pick up Reagan's suggestion for a two-year negotiation on a "joint or cooperative transition" to deployment of SDI.

■ Reagan had to intervene personally to iron out the differences between his two top advisers over what the letter should contain. Over the strenuous objections of Defense Secretary Caspar Weinberger, Reagan included the key recommendation of Secretary of State George Shultz: language linking cuts in offensive Soviet missiles with continued U.S. adherence to the ABM treaty, which Gorbachev recently proposed as "a framework for a solution." But at Weinberger's insistence, Reagan stipulated that he would not agree to anything that would slow, let alone curtail, the development of Star Wars (beyond the budgetary slowdown).

And he accepted Weinberger's argument that even the concession on linkage should be as vague and noncommittal as possible. "The linkage is obvious but not explicit," said one source. In response to Gorbachev's proposal for a 30 percent cut in offensive missiles, Reagan stressed his commitment to a 50 percent reduction, but went on to say that he had an open mind regarding smaller reductions en route.

■ Reagan's letter makes no mention of whether the United States would continue to abide by a "restrictive" interpretation of the ABM treaty—severely limiting SDI testing—or shift to a broader interpretation that permits everything short of deployment. But that was a key question raised by European leaders last week. Paul Nitze, one of three emissaries dispatched by the administration to brief the allies, assured them that the president had no intention of moving to the broader interpretation.

■ Reagan's dogged pursuit of Star Wars received a backhand boost last week from a report that the program could cost approximately $670 billion to build and operate over a 10-year period. Though administration officials dubbed it "an exercise in absurdity," other SDI researchers say that their own internal guesstimates have produced comparable figures. According to the study, by the Johns Hopkins University Foreign Policy Institute, building Stars Wars would add 1 percentage point of the GNP to the defense budget, bringing it up to 7 percent of the GNP—but that level of expenditure has been matched or exceeded in most peacetime years between World II and 1970.

JOHN BARRY *in Washington*

NBC NIGHTLY NEWS NBC-TV
7:00 P.M. AUGUST 6

President Backs SDI Program

CONNIE CHUNG: President Reagan vowed today to keep alive his Strategic Defense Initiative, Star Wars. He said his Administration was, quote, proceeding as fast as we can toward full development and full deployment. Reports to the contrary, he said, were wrong.

Chief White House correspondent Chris Wallace has more.

CHRIS WALLACE: The President flatly denied that in a recent letter to Soviet leader Gorbachev he offered to trade his Star Wars defense for big mutual cuts in offensive weapons. That's been called the grand compromise, central to a U.S.-Soviet arms deal. Today Mr. Reagan rejected it.

PRESIDENT REAGAN: Our response to demands that we cut off or delay research and testing in closed shop is, "No way."

WALLACE: There's been speculation the President would make that deal, since in the Gorbachev letter he offered to discuss Star Wars deployment. And yesterday the Senate rejected a big cut in Star Wars by just one vote, indicating the program is losing congressional support. But Mr. Reagan held out for his nuclear umbrella.

PRESIDENT REAGAN: When the time has come and the research is complete, yes, we're going to deploy.

[Applause]

WALLACE: Arms control advocates worry the President's position may kill chances for a U.S.-Soviet summit and hope Mr. Reagan will still trade Star Wars for an arms deal.

SEN. ALBERT GORE: At some point we have to choose. And the next four to five months will bring a moment of truth.

WALLACE: Meanwhile, Soviet television noted Gorbachev's year-long moratorium on nuclear testing has expired, with the U.S. still refusing to join. A Soviet official said a decision will be announced within days on whether to extend the ban.

Despite the President's hard line, officials here are confident that Gorbachev wants to keep talking and will still come to the U.S. this year. And they announced tonight a new set of arms talks in Moscow next week designed to clear the way for a summit.

USA TODAY 7 August 1986 Pg. 4

Reagan denies he's dealing on 'star wars'

By Johanna Neuman
USA TODAY

President Reagan wants a space defense shield overhead — and fewer people reading his mail over his shoulder.

In a rally-the-troops speech to supporters of his Strategic Defense Initiative, Reagan said that "when the time has come, and the research is completed, we are going to deploy SDI."

And in a dig at White House leakers, Reagan knocked down speculation that in his July 25 note to Soviet leader Mikhail Gorbachev, "I decided to seek some grand compromise" by delaying "star wars" in return for arms reductions.

"They don't know what's in that letter; I do," he said, promising never to "bargain away" the missile defense system."

"Star wars" is taking heat in Congress. The Senate came within one vote of cutting the $5.3 billion project. The House may slash it to $3.8 billion.

Sen. Sam Nunn, D-Ga., said the description of "star wars" as a population shield is losing votes in Congress: "You can't fit (it) on a bumper sticker."

But Rep. James Courter, R-N.J., said Congress needs to see short-term progress — research grants to universities, testing projects for nearby labs — to keep funding "star wars."

Reagan sympathized, but said rushing now could delay overall progress.

PHILADELPHIA INQUIRER 11 August 1986 Pg. 6

Arms talks must include 'Star Wars,' its director says

By Bryan Brumley
Associated Press

WASHINGTON — The "Star Wars" missile-defense program should be part of arms reduction talks with the Soviets, but the U.S bargaining stance should remain secret, the Air Force general who runs the program said yesterday.

"I do not believe it's Star Wars or arms control. I believe it's Star Wars plus arms reduction," said Lt. Gen. James Abrahamson, who heads the Strategic Defense Initiative, as Star Wars is formally known.

Some conservatives have accused the Reagan administration of trying to use Star Wars as a bargaining chip in talks with the Soviets. Some liberal critics argue that Washington should abandon the program and concentrate on arms reduction talks alone.

Abrahamson, interviewed on the NBC program *Meet the Press*, also disputed assertions by some critics that certain Star Wars research violates the 1972 Anti-Ballistic Missile Treaty.

"Nobody's junking the treaty. We're conducting the program within the limits of the treaty," Abrahamson said.

But he noted that the pact, which limits the Soviet Union and the United States each to 100 anti-ballistic missiles protecting a single site, also allows the sides to propose amendments and permits either nation to withdraw on six months notice.

"We are talking about it now, while we are conducting the research, which is exactly what the Russians are doing," he said.

President Reagan launched the research phase of the program in March 1983 to allow U.S. leaders to decide by the early 1990s whether to produce and deploy lasers and other weapons for a ground- and space-based defense against ballistic missiles.

Soviet leaders have denounced Star Wars, and although the two sides have been discussing the program as part of wider arms control talks, there is no guarantee that a new arms pact will allow its deployment.

A team of U.S. arms negotiators arrived in Moscow yesterday for talks aimed at preparing for a summit. The trip came after published reports that Reagan had sent Soviet leader Mikhail S. Gorbachev a letter proposing a 7½-year delay in deployment of Star Wars, half the time requested by the Kremlin.

Rep. Les Aspin (D., Wis.), appearing on the same program as Abrahamson, asserted that Reagan "hasn't given away much. He has offered a delay of 7½ years when clearly before we are ready to deploy, it is going to take more than 7½ years."

Abrahamson, who has said that research on Star Wars weapons would not be completed before the early 1990s, declined to discuss the reported offer.

"What you are asking is that whatever the negotitating strategy that the President has ought to be laid ought now in public beforehand. I don't think that's right," Abrahamson said.

However, he repeated Reagan's statement that Star Wars "is not a negotiating chip as such" and that U.S. and Soviet negotiators "need to discuss and find a way to make that transition" from the current limits of the ABM treaty to an agreement that would allow more potent defense against missiles.

NEW YORK CITY TRIBUNE 11 August 1986 Pg. 5

SDI Head Says Defense Budget Cut Will Slow but not Cripple Research

WASHINGTON, Aug. 10 (Reuters) — A cut in President Reagan's military spending request voted by the Senate will slow but not destroy research efforts on a defensive anti-missile shield, the head of the Pentagon's Strategic Defense Initiative program said today.

The Senate Saturday overwhelmingly passed a $295 billion defense spending bill for 1987 which would slow Reagan's arms build-up, redefine the objectives of the missile defense system and reduce funding for it.

But Lt. Gen. James Abrahamson, who heads the SDI program, said the program will survive despite the Senate's reduction of the Reagan Administration's $5.3 billion funding request to $3.9 billion.

"I believe a cut of the magnitude that we're talking about this year will slow some things down — vital things," Abrahamson said on the NBC News program, *Meet the Press*.

"But to say that program is decimated and it can't go forward I think is not accurate," he said.

Abrahamson, who repeated the administration's claim that SDI will not be used as a bargaining chip in arms talks with the Soviet Union, noted that the program has been cut by Congress for the last 3 years.

"I think there's no question that the cuts we've had in the program have certainly effected it," he said.

But the debate among lawmakers today has shifted from whether the program should exist at all to how much should be allocated to it, Abrahamson said.

The focus on defense spending and the SDI program now moves to the House, which is scheduled to complete action next week on a $285 billion military spending bill which differs significantly from the Senate measure.

House Armed Services Committee Chairman Les Aspin, a Wisconsin Democrat who appeared on the same program, predicted the House would pass an even lower SDI budget than the Senate — between $2.85 billion and $3.2 billion.

BUDGET...Continued

Key differences between the House and Senate bills virtually guarantee that House-Senate negotiators will have to reconcile the two versions after Congress returns from a 3-week recess in September.

While the Senate gave Reagan most of what he wanted, it cut $25 billion from the president's overall 1987 defense spending request and provides for no real growth in the military budget, after-inflation, over 1986.

The Senate also directed the administration to restructure the SDI program so its major focus would be on defending U.S. missiles and command centers rather than the American population.

Senators have repeatedly complained that the administration was confused and divided about what the project should achieve. They also said Reagan's vision of a leak-proof shield protecting the world from Soviet missiles was unrealistic.

Efforts to slash the program even more were defeated by a close 50-49 vote, indicating that after House action, the program's critics may ultimately cut SDI to $3.5 billion or less.

Some SDI money was shifted to conventional weapons research, which Sen. Sam Nunn, D-Ga., said was a critical need.

Under limits imposed by the Gramm-Rudman budget-balancing law, Congress is ultimately supposed to enact a defense bill with a $292 billion authorization figure — setting broad policy over several years — and a $279 billion outlay figure — the amount the Pentagon can actually spend next year.

Arizona Republican Barry Goldwater, chairman of the Senate Armed Services Committee, and Nunn, the panel's senior Democrat, have promised to accept the $292 billion authorization figure in conference with the House.

But they said if the Gramm-Rudman outlay targets are met, the United States faces more than $400 billion in military cuts over the next 5 years, which will create a "crisis for defense".

CBS Morning News — WUSA-TV, CBS Network

August 12, 1986 7:00 A.M. — Washington, D.C.

Strategic Defense Initiative

BRUCE MORTON: We've been told that they are serious and that they are exploratory, but we don't really know what U.S. and Soviet arms negotiators are talking about in their second day of talks near Moscow. The session is a necessary step toward a possible second Reagan-Gorbachev summit. And you can bet that the topic of Star Wars has come up. That's the defense plan which the President calls SDI, which the Soviets have called unacceptable.

And we've asked our Pentagon correspondent David Martin to stopin this morning to give us a status report on Star Wars and how it fits into the arms control process. He's in our Washington newsroom.

David, I get confused just starting out with all this, because here's the President saying, "Well, maybe we'll delay. Maybe we won't. We will deploy. We won't deploy." Is this deployable? I mean is this a physical weapon, or is this still basic research that's being done? What is the SDI at this point?

DAVID MARTIN: Well, right now SDI is basic research. They are still looking for what scientists call the unknown unknowns. In other words, they're still trying to find out, in many of these areas, whether there is some law of physics or nature which says you can't do this.

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STRATEGIC DEFENSE INITIATIVE...Continued

There are some areas in which they are much more advanced than others. There is one area in particular, that of terminal defense -- terminal defense being the last stage of a missile's flight toward its target, when the warhead is descending back into the earth's atmosphere and coming down on its target. That phase of terminal defense is well in hand, in terms of the technology for shooting down one of those incoming warheads with one of our missiles.

But to say that the technology is understood is by no means to say that you are ready to do deploy it. Because once you understand the technology, you still then have to develop the weapon system that would use that technology. And then once you've developed that weapon system, you then have to deploy it in the numbers that you would need to make it an effective weapon system.

Once you begin that development process with an ordinary weapon, like a tank or an aircraft carrier, you're talking eight to ten years for deployment. So if we were to start today, and assuming there were no glitches in just this one phase, terminal defense, it would be the mid-1990s before we could deploy.

Now, that's a technology that we understand about as well as it can be understood. The more exotic things, the examer (?) lasers, neutral particle beams that would be based in space, those are still in the exploration phase, and you really are talking about systems that, even with a crash program, probably could not be deployed until the 21st Century.

MORTON: So, when they say, "Well, we might delay deployment for five to seven years," aren't we really kind of fibbing, because we couldn't deploy anything for five to seven years anyway?

MARTIN: Well, what he's saying is that we will abide by the ABM treaty for five to seven more years, and that's our sort of going-in position versus the Soviet request that we pledge to abide by the ABM treaty -- that's the anti-ballistic missile treaty, which is supposed to limit the development of these defenses against offensive nuclear missiles. The Soviets have asked us to abide by that treaty for 15 to 20 years.

And depending on your interpretation of that treaty -- and that's a big qualification to this because there are varying interpretations of what that treaty allows and what it doesn't. But depending on the variation of the treaty, if you agree to abide by that treaty for 15 to 20 years, you will restrict what you can do in terms of Star Wars testing, Star Wars development.

So, in that sense, we, in contemplating the issue of how long we are going to continue to abide by the ABM treaty, we are

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STRATEGIC DEFENSE INITIATIVE...Continued

making Star Wars negotiable. Although the President continues to say, as clearly as it can possibly said, that Star Wars is not negotiable, Star Wars is not a bargaining chip. When we get it ready to deploy, we will deploy.

MORTON: But in fact, David, isn't that a decision that is going to be made by the next President, or even the one after that?

MARTIN: Exactly. He is not going to be around to make that decision. And you would expect him to say what he's saying, in the first place, because it's your going-in position to a negotiation. But in the second place -- and Caspar Weinberger, the Secretary of Defense, has told this as plainly as he can. The second he starts saying that Star Wars might be negotiable, the funding from Congress for Star Wars research is going to drop through the floor because they're going to say, "Why spend all of these billions of dollars" -- and it is billions of dollars. "Why spend all these billions of dollars on a program that's not going to be deployed?"

MORTON: David, we thank you for some light where we needed some light.

CHRISTIAN SCIENCE MONTITOR 13 August 1986 Pg. 1

'Star wars' may include nuclear launch device

By Peter Grier
Staff writer of The Christian Science Monitor

Washington

The Strategic Defense Initiative Organization is paying a San Diego company $59,000 to study the feasibility of shooting large payloads into orbit with nuclear explosive power.

Under this "contained catapult" concept, a one-kilometer-deep hole would be dug in the ground. A nuclear device, perhaps a special pulsing reactor, would be placed at the bottom. Up to 1 million pounds of equipment destined for space would be piled on top.

Setting off the device would launch the payload with tremendous force all the way to high Earth orbit, 23,000 miles in space. A spokeswoman for the company working on the concept, Creative Enterprises, compared it to a space gun mentioned in H. G. Wells novels.

"It's a wonderful idea," she said.

Proponents of the theory say it would be safe. Technology developed during underground nuclear testing would allow such explosions to take place without any release of radioactivity, they say.

Critics of SDI differ in their assessment, some labeling the project a boondoggle. "This could be SDI's $400 hammer," said one congressional aide, referring to Pentagon purchases of overpriced spare parts.

The little-noticed catapult research is being paid for via a program that sets aside SDI research money for small businesses. Some details of the work were provided by a company official. Others came from congressional sources.

In recent weeks, administration officials have been fighting hard to prevent cuts in SDI's 1987 budget. Defense Secretary Caspar W. Weinberger; the SDIO director, Lt. Gen. James Abrahamson; and others have said that any reductions from their request would greatly damage the SDI program.

At the same time, SDI has been nagged by allegations that some of its money is not being spent wisely. A recent report from the General Accounting Office concluded that some SDI research money was being used for projects that should have been paid for by general military construction funds. In 1985, for instance, the Army Strategic Defense Command used $1 million in SDI money to replace the roof of a control building at the Kwajalein Missile Range.

The GAO also said the Army used $100,000 in SDI funds to pay the United States Fish and Wildlife Service for maintenance of the shutdown Safeguard antiballistic missile site in North Dakota.

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DEVICE...Continued

SDI director Abrahamson, replying in writing to the GAO's findings, said that during SDI's "formative years ... the usual turbulence associated with the initiation of a major new program was encountered." He added that more controls over SDI spending were now in place.

Research on the contained catapult is being paid for by SDI's Small Business Innovation Research program. This program, established by Congress and overseen by the Small Business Administration, requires large government agencies to set aside a small portion of their budget to fund innovative ideas of small firms.

Other such SDI small-business contracts include one to J. H. Wiggins Corporation of Redondo Beach, Calif., for development of armor that would protect satellites against laser attack, and one to San Diego's Jaycor for "optimized volumetric negative hydrogen ion sources." This mouthful is a method of enhancing laser beams.

The reasoning behind such awards is that today's technology can't answer all SDI's needs, and some seed funds are necessary to help develop far-term concepts.

The contained catapult of Creative Enterprises is the brainchild of the firm's head, Dr. Ralph Cooper, a physicist. The concept is not new. It dates from the 1960s, when the Los Alamos national lab's Project Rover studied the feasiblity of a nuclear-powered rocket to the moon.

BALTIMORE SUN 13 August 1986 Pg. 4

House trims 'star wars,' calls for SALT adherence

By Vernon A. Guidry Jr.
Washington Bureau of The Sun

WASHINGTON — The House told President Reagan last night to stick by the limits of SALT II and voted new reductions in his "star wars" program in a show of liberal strength on arms control issues.

By a party-line vote of 225-186, the House sought to block the administration from exceeding the limits of the 1979 SALT II arms control agreement with the Soviet Union

The provision is unlikely to survive the Senate, but it showed that there is "a change of feeling out there. People aren't buying what they're being handed," said Representative Nicholas Mavroules, D-Mass., a leading arms control advocate in the House.

Mr Mavroules also said that concerns about a mounting federal deficit helped swing the "star wars" cut.

Opponents charged that Democrats, by introducing the SALT issue as an amendment to the defense authorization bill rather than as separate legislation, were merely attempting to make a political point

The administration has declared the SALT agreement a dead issue and has announced that one of the treaty's provisions will be violated this fall when more than 130 B-52 bombers are equipped with cruise missiles. Many Democrats have opposed that action and have sought to make plain their differences with the Republican administration

"This is raw politics and everybody knows it," said Representative Henry J. Hyde, R-Ill.

Opponents and supporters alike agreed that the Soviet Union has violated provisions of the SALT treaty, which has been observed but never formally ratified by the United States.

Representative Les Aspin, D-Wis., chairman of the House Armed Services Committee, maintained that SALT was a break on Soviet arms expansion and that to abandon it now would "just turn over the arms race to the Soviet Union. The Soviet Union is in a much better place to take advantage of it."

In its "star wars" vote, the House voted 239-176 to authorize $3.13 billion for the president's space-based missile defense system next fiscal year, more than $2 billion less than the administration requested The House Armed Services Committee had proposed $3.7 billion.

"It allows everything that's needed," said Representative Charles Bennett, D-Fla., the prime sponsor of the amendment calling for the $600 million cut.

The administration requested $5.3 billion for the program, formally known as the Strategic Defense Initiative.

The Senate voted $3.9 billion for the program. When the House and Senate get together in conference committee next month, they are likely to split the difference.

Mr. Bennett's figure represented the current SDI appropriation plus a 3.5 percent increase for inflation.

Backers of the House committee version had said that the Bennett amendment would "fatally wound" SDI, an argument that failed even among many of the program's supporters.

Representative Roy P. Dyson, D-Md.-1st, a supporter of the Bennett amendment, told the House that research into a strategic defense was a good idea but one that seemed out of control.

"Mine is a protest vote," he said off the House floor. "I don't feel they are spending the money correctly."

Mr. Dyson said the way SDI research money has been spread around smacked of pork barrel, a theme picked up by other critics.

Representative Robert Mrazek, D-N.Y., called it "the biggest pork barrel project in the history of the world."

Representative Ron Dellums, D-Calif., sought a drastic cut in the program, offering an amendment that would have authorized $1.32 billion for the program.

The House voted 302-114 against Mr. Dellums' amendment.

FEATURES/COLUMNISTS

DEFENSE SCIENCE 2004+ April/May 1986 Pg. 57

The Future Of SDI:

CAN WE SEE THE TREES FROM THE FOREST?

JON ENGLUND and
ROBERT DAMASHEK

The future of the Strategic Defense Initiative depends upon much more than arms control with the Soviet Union, whether our next President is a Republican or Democrat, and even how many dollars are pumped into the program. In a twist on the old adage warning of missing the forest from the trees, in the case of SDI, the trees are the key to the program's success.

Our national research effort into ballistic missile defense technologies is geared to allow the United States to make an informed decision about both the potential of the technology and what kind of strategic defense would enhance our national security. The biggest obstacles to reaching this goal are somewhat different than many suppose.

The success of SDI will be determined less by the "big picture," high-profile influences treated so extensively by the media than some significant SDI management questions starting to surface. While less heralded, three critical elements will guide the technical success of the

Jon Englund, former Capitol Hill and Pentagon aide, is Director of Defense Strategy for Advanced Perspectives, Inc. (API). Robert Damashek is API's President.

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FUTURE...Continued

program. In turn, they will determine the future political (and economic) support of the program. Even draconian Gramm-Rudman budget cuts may be "small potatoes" compared with the following three challenges to General Abrahamson and his organization.

[1] The "Balancing Act," in which General Abrahamson needs to demonstrate progress in the research, but not so much that it bumps up against the ABM Treaty or invites charges of imminent deployments without full understanding of the long-term implications of the program.

[2] Allowing flexibility in the development of alternative SDI systems architecture and battle management, communications, command and control (BM/C') to incorporate evolving policy and doctrine considerations as well as technical developments. Driving policy and doctrine based solely on technological progress will sacrifice political support for the program. There are strong indications that policy and doctrine issues are not being treated with the necessary care in the prime contractors' SDI architecture development.

[3] SDIO must get a handle on program management, plagued by a plethora of problems. Examples of overlapping contract work due to diffused SDI decisions (beyond General Abrahamson's direct purview) and a potentially damaging gap between SDI expenditures and outlays has attracted charges that the "right hand doesn't know what the left is doing." The recent Eastport Study Group report on SDI battle management has proposed some innovative solutions to confront these problems (such as an "SDInet" to keep track of the program—both for speeding technical progress and running a tight management ship).

These solutions must be carried out before political confidence erodes any further.

THE 'BALANCING ACT'

The powers that be in the Department of Defense and SDIO face the thorniest of dilemmas: how to dispel the notion that SDI money is not being thrown down an R&D "black hole" without arousing fears that the administration's veiled intention is to hastily move toward deployments (without a prudent assessment of possible strategic instabilities)?

Testing and demonstrating SDI progress is a political tightrope, with a big impact upon future levels of support for SDI. Many fear that too robust a testing effort will threaten a "sacrosanct" ABM Treaty. The Department of Defense must be sensitive to this concern over the short-term, while in the long-term conducting a public education effort to reveal the inherent flaws of the treaty: the mistaken assumptions and advancing technology that change the strategic calculus.

The public needs to be better educated about the flaws of the ABM Treaty, and why a strategic reassessment of the treaty is so urgent. When the treaty was signed, we believed that by severely limiting defenses we would increase stability through mutual vulnerability. We believed that such vulnerability would take away the incentive to build more offensive missiles. We also believed that the ability of the US and Soviet Union to retaliate with unacceptable damage would remain secure.

But these assumptions were mistaken. History and the facts affirm it: nuclear weapons have both proliferated and become more accurate, threatening the ability of the US to retaliate. In the last three years alone (according to the London-based International Institute for Strategic Studies), the Soviet Union has increased its long-range nuclear warheads by 37 percent, and the US by 10 percent. Deterrence and the strategic calculus have weakened, with the risks of nuclear war more pronounced than in 1972, when the treaty was signed. To put it simply, the treaty has not been successful, by our own measures and critical assumptions.

In addition, the Soviets have spent as much on strategic defense as they have on offensive strategic missiles. This has eroded deterrence further. (It is unfortunate that the Soviets do not have a label for their robust strategic defense effort—it might more clearly focus public opinion on the scale and determination of the Soviet program).

The goal of this public education effort should be to pave the way for the deployment of point defenses (within the constraints of the treaty) to protect our land-based retaliatory forces, communications nodes and command centers. This is a vital, near-term use of strategic defense technology (using largely off-

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FUTURE...Continued

HIGH-TECH UNCERTAINTY

We simply do not know yet which SDI technologies will offer the most potential as defensive systems, so we cannot be specific about SDI expectations beyond the atmosphere. But at the very least, we do know that space research brings us closer to the day when we can abandon our mutual suicide pact with the Soviet Union, replacing it with a deterrence based on defensive systems.

Caspar Weinberger
Secretary of Defense

the-shelf technology) that would strengthen deterrence and provide better focus for SDI.

It would help encourage political support for the program, alleviating the "black hole," "technological filibuster" concerns that doom so many of our military programs to endless delay and indecision. Even the Chairman of the House Armed Services Committee, Les Aspin, seems firmly behind the value of protecting our retaliatory forces. In 1981 he authored a "one act play" in the *New Republic;* the one area of agreement between the two protagonists ("Hawk" and "Dove") was the need to protect our land-based missiles.

Such an approach balances the need to demonstrate technical progress and a gradual reassessment of the ABM Treaty. It would help solidify bipartisan political support by laying out in more clear-cut terms the administration's direction on SDI. Even more important, it helps fill a growing problem in our land-based forces that has weakened nuclear deterrence.

The administration appears to be moving in this direction. The DoD is reviewing the SDI program to glean what cost advantages might result from a less restrictive interpretation of the ABM Treaty.

The interpretation of the treaty recently prompted an interagency battle between the DoD and the State Department. President Reagan decided to follow the more legalistic, restrictive State Department view of the treaty, with Gen. Abrahamson restricted to partial test of the components, computer simulations and war gaming.

In recent testimony on Capitol Hill, Abrahamson said that with no treaty hindrances "we could go directly to the most convincing tests," saving money in the process.

Abrahamson also appeared more open-minded about the role of point defenses of SDI priorities. He said he was protecting an option of a "limited near-term deployment of a limited ABM capability," if the Soviets were close to breaking out of the treaty.

PRACTICAL STEPS

What are some of the practical steps Abrahamson should pursue if he were to follow this course? Greater emphasis should be placed upon testing and simulation that applies directly to a limited point defense, particularly in those promising technologies that have applications for both limited defenses as well as broader strategic defense potential.

For example, more resources should be devoted to ground-based lasers. More should be spent developing terminal and mid-course technologies like the Airborne Optical Adjunct (AOA) and the Homing Overlay Experiment (HOE). In general, more emphasis should be placed on simulation and testing, particularly through the "national test bed" currently under development. The goal is to demonstrate that diverse SDI technologies can work together. The broad scientific community and the public should be given some insight on the work's progress; as the recent Eastport Study Group on SDI battle management puts it, "the simulation effort will benefit significantly in quality and credibility if it is not kept behind walls."

Abrahamson also has a separate agenda for the test bed effort. It gives him a way to gain control over a decentralized program. The effort to give SDIO more centralized control over the program (and its success at managing the program effectively) may be Abrahamson's greatest challenge of all.

A recent look at SDI battle management by the Eastport Study Group is unconventional and refreshing. It is unexpected (but welcome) to find computer experts and scientists expounding the belief that evolving policy and doctrine must play the central role in the development of SDI architecture.

Dr. Danny Cohen and the other authors of the report are right on the mark: policy and doctrine are the crux of the matter. The direction and trade-offs of competing SDI architectures must be founded on this reality. They are also correct that the prime contractors involved in the SDI architecture "racehorse" neglected the evolution of policy and doctrine consideration in their work.

The contractors relied too heavily upon

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FUTURE...Continued

Volume V of the Fletcher Report, using it as their "common baseline by default." Put simply, the SDI Phase I architecture contractors did not sufficiently explore the implications of evolving military operational requirements (MOR), the threat, and strategy and tactics. Elaborating, the panel observed that "the technical problems of the system architecture and software development for a battle management system are interwoven with the entire problem of defining also—perhaps only after several phases or iterations—the MOR, policies, and strategies for its use."

Making a valid distinction between the potential differences between C^3 needs for offensive weapons and strategic defense, the authors point out that "the same degree of control required for the strategic offense may not be required for a solely defensive force. Thus, the eventual process of political approval for SDI could lead to alterations in the military doctrine employed by the operational forces. The system will require continuous user-developer interactions to ensure that the architecture meets the evolving threat and the dictates of national policy."

The key is flexibility in the architectural development to incorporate these critical and evolving considerations. The panel felt that the focus on hardware at the expense of BM/C^3 does not allow sufficient flexibility for evolving policy and doctrine.

The Eastport Study Group derides this "applique systems" approach, as they term it. The panel does not mince its words.

"The proposed Phase I system architectures presented to the panel were developed around sensors and weapons. In spite of the sound advice in Volume V of the Fletcher report that the battle management system and its software must be designed as an integral part of the ballistic missile defense (BMD) system as a whole, not as an applique, these contractors treated the battle management computing resources and software as a part of the system that could be easily and hastily added."

Continuing, the Eastport Study Group maligned the relative weight given to hardware and software by the primes.

"The contractors treated battle management as something that is expected to represent less than five percent of the system, and therefore could not significantly affect the system architecture. They have developed their proposed architectures around the sensors and weapons and have paid only 'lip service' to the structure of the software that must control and coordinate the entire system."

While the Eastport criticism on this may be unduly harsh in tone, more focus and resources clearly must be devoted to battle management—now. SDI is an iterative process; we must start somewhere. The issue is not hardware versus software as such; rather, it is developing a coherent, working system as a whole. Time has come for a change in emphasis.

The recently formed SDI Institute, the Federally Funded Research and Development Center (FFRDC), could make a big difference. It has a broad mandate in SDI integration and also policy and doctrine considerations. One of its principle tasks will be to analyze offensive and defensive scenarios, drawing useful conclusions. If the FFRDC is given the clout it needs, it could help fill a big SDI gap, unfettered by any vested interests.

THE PENTAGON'S PICK

Gen. Abrahamson faces program management problems across a broad front. Not only are SDI decisions diffused among the services (there is a pressing need to centralize aspects of the program), but an innovative approach is a prerequisite of successful program management for such an unprecedented research project. A dynamic, sophisticated approach is needed to both spur technological developments and to maintain management control over contractors' work.

If the public perceives that money devoted to SDI is not used effectively and prudently, political confidence in the program will erode rapidly. There is an unprecedented opportunity for SDIO to take the bull by the horns and correct a potentially damaging management situation before public confidence erodes.

This window of opportunity may not exist for too long—there are indications that the diffused nature of the program has resulted in overlapping projects among the various defense SDI program forces. For example, Space Command in Colorado Springs, the Army

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FUTURE...Continued

Ballistic Missile Defense headquarters in Huntsville, AL, the Rome Air Development Center in Rome, NY, and SDIO itself has advertised RFPs in the Commerce and Business Daily that ask for similar work. It is doubtful that this is deliberate (for the sake of variety). These groups represent the institutional concerns of the Air Force, Army, Navy and the Department of Defense.

In addition, there have been charges aired on Capitol Hill that the SDI program has geared up too quickly (too much money has been authorized and appropriated) for SDIO to absorb these funds. It is easy to see how this argument can be exploited to scale back SDI budget requests for the sake of efficiency.

Statistics can be taken out of context that appear to prove that a significant gap exists between obligations and expenditures. For example, critics have argued that since only 12 percent of fiscal 85 funds were spent by April 30 of last year, the program is overfunded. What they omit is the fact that 62 percent of the funds were obligated by that time, and both the obligation and expenditure rates were on or slightly ahead of schedule.

Also, SDI practices are not out of line with other strategic R&D programs. By April 30, 1985, for example, the Air Force had spent 15 percent of its strategic programs budget, and the Defense Advanced Research Projects Agency (DARPA) had spent 5 percent. We are about to witness the same debate with similar statistics during this fiscal year budget battle. But with the even bigger percentage increase in SDI funding last year, will the charges become ever more difficult to answer adequately?

Several changes must take place to avert a magnification of these charges. First, Abrahamson must continue to work on developing the national test bed as a mechanism to gain control over disparate elements of the program. This is a great opportunity that Abrahamson must exploit bureaucratically.

Second, Abrahamson should give top priority to development of an Eastport Study Group proposal—an "SDInet" to "encourage cooperation, information exchange, and resource-sharing among the SDI contractors." Such an "SDInet" should also be exploited as a SDIO-centered program management tool to get a handle on the diverse and growing contracts list. An "SDInet," modeled loosely on the successful "ARPAnet" used by DARPA for the transfer of technical information, could provide a wide variety of vital information exchange, simulation and contract management services critical to SDI's long-term future.

As the Eastport group said, "the special characteristics of the program, particularly its dependence on advancing technologies, justify innovative approaches to program management. . .SDIO needs a program management structure and contracting method that allow it to alter and adapt its program as rapidly as technology issues are resolved. Automated means of tracking program interdependencies are needed, as are special contracting methods, or changes in specific DoD program management guidelines."

Hopefully, Abrahamson is taking this advice to heart.

COMPREHENSIVE SOLUTIONS

These three challenges facing our SDI effort (the Balancing Act, Evolving Policy and Doctrine and Program Management) are tightly interwoven, bound by a common need for retaining control in the face of complexity. Abrahamson can take a comprehensive approach to dealing with all these issues by implementing an advanced, automated system for encouraging SDI information exchange.

Using "SDInet" as a vehicle to achieve this exchange of information, the system could support capturing and assessing evolving policy and program needs and objectives. Both "SDInet" and the national test bed have potential to chart these changes and quickly assess the state of the program, analyzing feedback from the SDI community and uncovering overlap in proposed contracts.

On a broad level, then, solutions to Abrahamson's predicament, and the success of the SDI mission, depends upon a shared understanding of the program's priorities. So far, all the SDI reports (Eastport, the Jason Report on automated software programming and Fletcher) have danced around this issue. Each makes important contributions, but none focuses on the fact that this broad understanding of priorities is central to allowing

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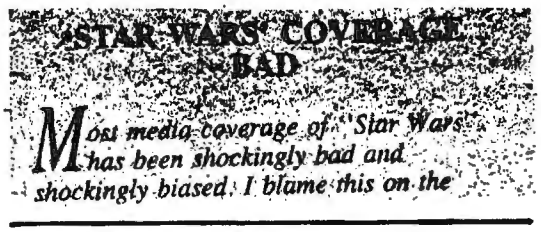
FUTURE...Continued



media's antimilitary tendencies, the military's idiotic lack of common sense in their own defense and the media's lack of technical expertise.

Jules Bergman
ABC News Science Editor

the US to make an informed decision about the potential of the technology and how a strategic defense would serve our national security.

The desires, pet projects, and professional interests among all the researchers, contractors and agencies much be set aside. The bottom line: all the actors must become subservient to the needs and goals of the SDIO mission, determining whether it is possible to defend the US against nuclear attack. This is an extraordinarily difficult test of the discipline of these individuals and organizations; many will surely fail the test unless SDIO takes direct steps to help them succeed.

It is all too easy for SDI participants to become engrossed with how a problem is solved (technology, engineering, hardware), ignoring the needs to clarify and communicate what the problem is (policies, architecture). The result of this imbalance between "how" and "what" is ambiguity, under- or over-specification and misconceptions.

A new discipline of design automation called "Requirements Engineering" holds great promise and may provide a quantum leap in solving these endemic problems.

Capturing requirements is an iterative, multi-layered, and evolutionary process—research into how to solve a complex problem always reveals new aspects of the problem. Changing threats, unexpected events on the world scene and other issues may lead to modification of policies, and changes in the problem.

The Eastport Study Group's "SDInet" proposal is geared to promote communication among SDI participants and establish an SDI technical community. Such a communications network is of no value without a set of standards which proscribe the way information is conveyed throughout this community. Defining the set of standards demands requirements engineering to avoid micro-management, information overload and utter confusion. This task is the essence of implementing "SDInet."

Coping with the scale of SDI information complexity demands novel approaches to information access and presentation. These approaches sound futuristic, but their time has come. Each participant has interests, talents, responsibilities and clearances which determine his/her information access needs. To reduce information overload, an electronic mailbox concept can be employed by an intelligent information access manager to automatically notify a participant of significant events (success/failure of an experiment, available new tools and technology, policy changes, etc.).

High-performance computer graphics have become affordable and can give participants access to information and a clearer understanding of SDI's progress. Animated scenarios can be used to convey the intent of results of SDI experiments—without reams of paper. Rapid on-line information browsing can help bring new participants up-to-speed quickly, countering personnel and contractor turnover. Information abstraction can quickly give SDIO a sense of the project's overall progress, and identify potential problem areas.

The Challenger tragedy might have been avoided if the information about the low temperature readings of the Shuttle had been conveyed to low-level management. An "SDInet" approach would have alerted these managers of this unfolding disaster. While the analogy between NASA's programs and SDI is limited, can we afford not to work toward such an advanced information management system for SDI?

In short, "SDInet" can be used as a vehicle to tie together all of the diverse activities of this great challenge coherently. Along with the test-bed effort, it provides a generic way for Abrahamson to gain control over the program and speed technical progress. It also provides an effective way to perform his balancing act: simulating and testing to demonstrate progress without arousing public fears of an ill-informed, rush program. Finally, this approach allows greater flexibility in the development and incorporation of evolving policy and doctrine and BM/C³.

Can Abrahamson and the administration see the trees from the forest, looking beyond "big picture" SDI concerns for the sake of making this world more secure? □

Space Weapons and Arms Control

One of the major controversies concerning the United States Strategic Defence Initiative (SDI) programme is this: how far can it go without violating existing arms control treaties. It is a question of some importance since even those NATO allies which support the SDI in principle do so with the qualification that the programme must respect existing international obligations. ***Jozef Goldblat,*** *in charge of the arms control and disarmament programme at the SIPRI, examines the legal implications of SDI.*

Several agreements restrict the activities of states in outer space——the environment where new means of protection against nuclear missiles, as provided for in the US Strategic Defence Initiative programme, would be stationed. Should such means include X-ray lasers, as has been recently proposed, to be powered by nuclear detonations in space, two treaties would be violated——the 1963 Partial Test Ban Treaty and the 1967 Outer Space Treaty. The first prohibits any nuclear explosions "in the atmosphere; beyond its limits, including outer space" (Article I, 1(a)). The second prohibits placing in orbit around the earth "any objects carrying nuclear weapons or any other kinds of weapons of mass destruction", installing such weapons on celestial bodies, or stationing them in outer space "in any other manner" (Article IV). The USA is not only party to these two multilateral agreements, but has also been (together with the Soviet Union) their principal sponsor.

The main relevant agreement is the 1972 US-Soviet Treaty, which limits anti-ballistic missile (ABM) systems, defined as systems "to counter strategic ballistic missiles or their elements in flight trajectory" (Article II). According to the Treaty, as modified by a 1974 protocol, each side is permitted to deploy only one geographically, quantitatively and qualitatively constrained ABM system--either at its national capital or a complex of intercontinental ballistic missiles (Article III). This permission to deploy applies only to *Fixed land-based* ABMs--and it is also only for *fixed land-based* ABMs that there is allowance for some limited development and testing (Article IV). Development, testing or deployment of ABM systems or components which are "sea-based, air-based, space-based or mobile land-based", are expressly forbidden (Article V).

It is true that in Agreed Interpretation D, attached to the Treaty, the parties stated that "in the event ABM systems based on other physical principles and including components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars are created in the future, specific limitations on such systems and their components would be subject to discussion...and agreement". However, it is quite clear that the US Government has taken the view, throughout the period since the Treaty was signed, that the allowance to develop and test ABM systems based on "other physical principles" applies only to *fixed, land-based* systems. This official US interpretation is set out in the Arms Control Impact Statements which the President has submitted to the Congress year after year. The latest, for fiscal year 1986, was published in 1985.[1] There is thus no basis for the position of some US officials, who have used Agreed Interpretation D in an attempt to justify testing and deployment of *space-based* anti-ballistic missile systems.

If the ABM Treaty is to be respected, the SDI programme, in so far as it provides for systems other than fixed, land-based ones, must not enter the stage of development and testing. The meaning of these terms was explained by the US negotiator, Ambassador Gerard Smith, in the Senate Armed Services Committee during its hearings concerning ratification of the ABM Treaty, as follows:[2]

> The prohibitions on development [of systems, devices or warheads] contained in the ABM Treaty would start at that part of the development process where field testing is initiated on either a prototype or breadboard model...The fact that early stages of the development process, such as laboratory testing, would pose problems for verification by national technical means is an important consideration in reaching this definition. Exchanges with the Soviet delegation made clear that this definition is also the Soviet interpretation of the term 'development'.

This statement has been regularly repeated in the annual US Arms Control Impact Statements.

Thus, the assertion frequently made in the USA that field testing is not included in the notion of development is inconsistent with the official US interpretation of the ABM Treaty prohibitions.

Research alone into any kind of space-based defensive systems is not unlawful *per se*. Soviet assertions to the contrary have no basis in the letter of the Treaty. They also contradict the statement made in 1972 by Minister of Defence Grechko before the Soviet Presidium:[3] "[The ABM Treaty] places no limitations whatsoever on the conducting of research and experimental work directed towards solving the problem of defending the country from nuclear missile strikes".

Nevertheless, such activities are hard to reconcile with the purpose of the ABM Treaty, which is to deny a defence of the territory or of an individual region (except as specifically allowed) of each party against ballistic missiles. Thus, planning for such a defence with whatever means, current or 'futuristic', contradicts the spirit of the ABM Treaty. It may undermine the very philosophy which thirteen years ago led the negotiators to recognize that limitation of anti-ballistic missile systems would be a "substantial factor in curbing the race in strategic offensive arms and would lead to a decrease in the risk of outbreak of war involving nuclear weapons" (paragraph 3 of the Treaty Preamble). This was equivalent to an admission that search for a ballistic-missile defence would render nuclear war more probable by creating a new source of strategic instability.

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[1] Joint Committee Print, 99th Congress, 1st Session, Washington, April 1985, p. 36.

[2] Hearings, 92nd Congress, 2nd Session, 18 July 1972, p. 377.

[3] See note 1, p. 35.

COMMENTARY

Initiative or Response?

by Graham M. Kinahan

President Reagan's Strategic Defense Initiative is invariably criticized as being unnecessarily provocative to the Soviet Union. Our opponents would prefer that we halt this effort and seek to use mutual restraint and arms control to regain a posture of mutual vulnerability to offensive nuclear arms. This attitude reflects a naïveté about the long and deliberate effort the Soviets have taken to protect themselves. To quote the grey eminence of arms control, Ambassador Paul Nitze, "Over the last two decades, the Soviet Union has spent roughly as much on strategic defense as it has on its massive offensive nuclear forces."

It is a gross misperception of the military balance between the superpowers to believe that our heroic attempts to defend ourselves is causing an arms race. We are not venturing into uncharted waters. The Soviets have assiduously mapped the terrain for us by methodically improving their own defenses, despite their formal pledge nearly fifteen years ago not to do so. The best scientific minds of this country are hard at work on SDIO contracts in our national laboratories not trying to wake the sleeping Russian bear and unleash an arms race in space, but in a concerted research effort to narrow the Soviet's margin of advantage in strategic defense.

The Soviets have already raised the ante by several points; we are involved in a vigorous attempt to catch up. The Soviets have the only operational system for destroying orbiting enemy satellites, a so-called ASAT system. They have violated the provisions of that supposed "jewel in the crown" of arms control agreements, the 1972 Anti-Ballistic Missile Treaty, by building the Krasnoyarsk ballistic missile detection and tracking radar which will complete an arc of radar coverage capable of detecting incoming missiles from any direction. They have upgraded and expanded the world's only operational ABM system around Moscow with better radars and 100 re-usable missile launchers; and most importantly, they have conducted extensive research into advanced technologies for defense against ballistic missiles, including laser weapons, particle beam weapons, and kinetic energy weapons—precisely the research areas in which U.S. scientists are working to arrest the Soviet lead.

Developing sophisticated air defenses with particular emphasis on low-flying enemy aircraft and cruise missiles has also been a high priority. Nor have they ignored the responsibility of protecting an entire class of key personnel with passive defensive measures and assuring the survivability of their mighty offensive missiles by spending billions of rubles for hardening and survivability.

Modernization of the ABM system around greater Moscow, which is permitted under the 1972 Treaty, should be complete by 1987. Known as the GALOSH system, its silo-based, long-range, nuclear-armed missiles are designed to intercept warheads in space shortly before they re-enter the Earth's atmosphere. High-acceleration interceptors, called GAZELLE, are also being installed to engage targets within the atmosphere. Moreover, all of these silo-based systems can be re-loaded and fired again.

The Soviets have dedicated a far greater investment of plant space, capital, and manpower to advanced ABM research than has the U.S. Gen. Lawrence A. Skantze, Air Force Systems Commander, recently stated that Soviet deployment of battlefield laser weapons is due even sooner than U.S. experts predicted. According to the Pentagon's annual edition of *Soviet Military Power*, the U.S. would have to spend about $1 billion a year on lasers to match the Soviet effort which already includes a limited operational capability at one research site to blind low-orbiting American reconnaissance satellites by laser beams. The U.S. currently depends on just a few such satellites to monitor developments like the Krasnoyarsk radar facility. With the recent grounding of our entire heavy space-lift capability, it will be some time before we can replace broken satellites.

To be sure, there are several valid reasons why we should be trying to convince our leaders that even a primitive, first generation system of defenses against missiles is what we need. However, none is perhaps as compelling as the fact that the Soviets are well ahead of us with their research.

We must also consider the uncertainty of domestic politics. President Reagan has a golden opportunity to go down in history as not just another president in pursuit of an elusive arms control agreement (arguably not worth the paper it's signed on unless we are safeguarded from possible violations with strategic defenses), but as the leader who shifted our strategic orientation away from one which perpetuates unilateral assured vulnerability to one which bolsters deterrence with an ability to defend ourselves.

Soviet strategic nuclear superiority, which now exists by a wide margin, will continue to grow despite the Reagan Administration's strategic offensive force modernization programs. This growing imbalance is the principal reason why the President began the SDI program. The Soviet Union already has an advantage over us in offensive capabilities. We must avoid at all costs the risk of having them achieve a similar advantage in defensive capabilities as well.

We are not so much engaged in an "initiative," but what should more appropriately be called a strategic defensive "response." We are just now playing "catch-up" for twenty-five years of Soviet efforts to develop and actually deploy active and passive defenses. Unless we pursue deployment of strategic defenses, the very instability feared by proponents of the 'status quo' will occur, but as a consequence of a unilateral Soviet defense capability in addition to strategic offensive superiority.

ST. LOUIS POST-DISPATCH 7 July 1986 Pg. 3-B

John Chamberlain

A Simple Precurser To SDI's Protections

NEW YORK

Dr. Edward Teller, who doesn't like to be reminded that he is the father of the H-bomb, has told a committee of Congress that experiments have shown that a nuclear-powered X-ray laser device, popped up by a submarine, could destroy any number of incoming Soviet warheads. Teller urged a $200 million expansion of the SDI, or Star Wars program, to pay for further laser experiments.

Since SDI director Gen. James Abrahamson has said the Soviet Union is well ahead of the U.S. in laser development, Teller's advice is quite in order. But X-ray lasers sound complicated to the layman. Gen. Daniel Graham of High Frontier (a private, nonprofit foundation that promotes SDI) and Martin Anderson of the Hoover Institution at Stanford University concur in thinking something immediate could be done to assemble an off-the-shelf interceptor defense that need not wait for development of lasers and particle beams.

What Martin Anderson has stressed is that interception is a fact. Two years ago, the Army aimed an old Minuteman missile at a target 4,000 miles away. It then set up an interceptor equipped with an ultrasecret sensing device. The interceptor homed in on the Minuteman some 100 miles above the Earth. Both the Minuteman and the interceptor were instantaneously pulverized.

Anderson feels that what could be done once can be done again. The Army, he says, is now working on a better interceptor called ERIS, or Exoatmospheric Re-entry-Vehicle Interceptor Subsystem. Anderson figures that we could build 100 ERIS missiles for $1.5 billion spread over 10 years. The first missiles would be ready by the early 1990s.

The proposed 100 interceptor missiles would be legal under the ABM treaty, which limits the U.S. and the Soviets to one geographical ABM launch site each. The Soviets have set up their ABMs near Moscow, providing a defense shield for the capital. We have the right to put our ABMs at Grand Forks, N.D., if and when we choose to do so. Interceptor missiles launched from Grand Forks would protect the continental U.S., Mexico and most of Canada.

At a cost of $150 million a year, the Anderson proposal provides a basic insurance against anything short of an all-out Soviet nuclear attack. It would allow us to space out our more expensive research into futuristic SDI proposals. The set back to SDI experiments caused by the Challenger tragedy would be more easily digested if we were busy putting 100 ABM interceptors into place.

Martin Anderson is telling us to have the courage to be simple. With 100 ABM interceptors at our disposal we would not have to worry about SALT II or the progress of arms reduction talks at Geneva. And it would not particularly matter to an interceptor screen whether the incoming ICBMs had multiple charges in their heads or not. Or whether the incoming missiles were accidentally fired.

Congress will soon be debating the future of SDI. Thirty former Soviet scientists have issued an open letter to Congress warning of extensive Soviet development of Star Wars weapons. If Martin Anderson is right, we have already done the research needed for building an ABM shield. What is now needed is an appropriation for ERIS development.

WASHINGTON TIMES 11 July 1986 Pg. 2-D

ARNOLD BEICHMAN

Our space loss has been their gain

We ought to be thinking very hard about the five sequential space accidents experienced by the West and what — most importantly — it means to the future of President Reagan's Strategic Defense Initiative. I believe that the United States space program has been set back for a decade at least and with it, perhaps, SDI.

The Soviet Union has profited mightily by these five accidents. What had been a potential threat to what the Soviets call the "correlation of forces" or the balance of power against them and in the U.S. favor has in the space of 18 months turned in their favor. Meanwhile, the Soviets have a successful launch-a-month program and a working space station. The United States has nothing of the kind.

After years and years of success in space, we have suddenly seen five disastrous launches — two Titan rockets with military payloads, one manned Challenger shuttle with a military payload, one Delta rocket with a non-military, meteorological payload, and most recently, the French Ariane, also with a non-military payload.

Happenstance? Coincidence? Enemy action? NASA incompetence? Incremental carelessness? Congressional stinginess? All of the above?

The SDI program demands rockets able to launch orbiting components to build SDI space vehicles, and endowed with power and perfection perhaps 100 times greater than we have — or had — at present. The U.S. space program lacked such launch capability even before the shuttle disaster. Realization of the goal envisioned by an SDI program is now even further away.

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GAIN...Continued

The U.S. space program has been coasting along on technology more than two decades old. Since the 1971-1972 Apollo moon program successes, little new and significant technology has been introduced into the space program. In fact, the Delta and Titan rockets are based on 1960s technology.

Without minimizing NASA management's responsibility for the Challenger disaster last February (O-rings and valves are always a problem), blame for space failures must also attach, first, to the Nixon administration and then to subsequent ones and to refusal by Congress to appropriate funds which could have subventioned essential space research. SDI cannot be achieved on the basis of 1960s technology and 1970s space research. The failure of the shuttle and the Titan means that the United States cannot launch replacements for aging spy-in-the-sky reconnaissance satellites.

Yet with all this criticism, we still cannot ignore the enormous number of Navy secrets handed over to the Soviet Union by the Walker-Whitworth spy ring and other Soviet agents like the "Snowman and the Falcon" at the TRW facility. While the Soviets may not be great innovators in space, they have demonstrated a talent, starting with the atomic bomb, at what is euphemistically called "technology transfer," i.e., adapting Western or Japanese technological innovation to Soviet military purposes.

As of now, SDI may, for good or ill, be dead. Whether it can be restarted depends on how quickly U.S. space research can be financed and the essential scientific and engineering manpower, especially the latter, can be recruited. Otherwise SDI will remain a research and development program that will never leave the ground. And this time, if the SDI is restarted, let us be as certain as can be that the security aspects of the research as well as safety of space vehicles and stations are given top priorities.

It is up to President Reagan to tell the American people about the military crisis in space in which we find ourselves. On the Nicaragua "contra" aid program he demonstrated dramatically how the American public responds when it is told the hard facts. It is time to tell the American people the true story of America's space program which, sadly, is today little more than a battered pile of junk.

Arnold Beichman is a research fellow at the Hoover Institution.

WASHINGTON TIMES 9 July 1986 Pg. 3-D

DANIEL GRAHAM

How to begin the arms talks

Is arms control possible without the Strategic Defense Initiative?

Usually one hears this question the other way round from those who insist that deploying defenses would only cause the Soviets to deploy more missiles. They ask whether SDI is possible without arms control.

According to this school of thought we should stay with our historically fruitless SALT efforts to check the growth of the Soviet nuclear missile force as the first order of business, and throw in SDI as a bargaining chip.

Actual events indicate that arms control talks would be nowhere today if it were not for SDI. The president's non-nuclear defense initiative brought the Soviets scrambling back to the negotiating table after they had walked out with a vow never to return until we removed our noxious Pershing and cruise missiles from Europe.

And when they came back, it was with a single goal — stop SDI. Would they stay there or show any flexibility if we abandoned SDI?

We must not fold a peace-winning hand. And we should realize that the best possible chance for limiting or reducing the numbers of the most dangerous of offensive weapons, the long-range ballistic missile, lies in the *deployment* of SDI. Only when such weapons as ICBMs are no longer unstoppable or "ultimate" will the Soviets' urge to turn them out like sausages be quelled.

We need a new approach to arms control. The old approach was designed to create a "balance of terror" and then to maintain it. We strove to create a situation in which each side could heap about the same amount of destruction upon the other. Our negotiations from SALT I onward were designed to support the precepts of Mutual Assured Destruction.

The trouble was that the Soviets rejected the premises of MAD. MAD required a condition of mutual vulnerability to attack; that is, *no* defenses. The Soviets were happy enough to see the United States dismantle its strategic defenses, but they were not about to become nuclear nudists themselves. In fact, they have over the past several decades spent more of their rubles on strategic defense than on offensive weapons.

Their response to our self-imposed defenselessness against ballistic missiles was to build a huge force of such weapons to strike at our undefended retaliatory forces.

When we dismantled our defenses against bombers, the Soviets revived a long-dormant strategic bomber program.

It is the *absence*, not the presence, of strategic defenses which encourages the buildup of offensive systems, especially first-strike weapons.

It is this basic strategic error, which lies at the root of flaws in past arms-control agreements. We have tried to make MAD work through agreements with the Soviets, who find the doctrine incomprehensible on the one hand, and enormously advantageous to *their* strategy on the other.

The president is absolutely right to discard this MAD arms control approach and its flawed products.

But this does not mean abandonment of arms control efforts *per se*. In the past, we adopted a strategic posture of utter vulnerability and tried to negotiate with the Soviets to make that condition mutual.

Today we should adopt a strategic posture of non-nuclear defenses with fewer offensive nuclear weapons and negotiate with the Soviets to make *that* condition mutual.

Why not present the Soviets with a proposition along these lines:

We are going to deploy defenses against your first-strike-capable weapons. Those defenses will take time to deploy. When we judge our defenses capable of intercepting 20 percent of your ballistic missiles, we will be prepared to dismantle 10 percent of our missiles which constitute pre-emptive strike targets.

We urge the Soviet Union to pursue the same course so that the nuclear offensive threat diminishes as non-nuclear defenses are deployed. Such an approach should form a new basis for negotiations if, indeed, the Soviets have any real interest in reducing nuclear arms. It would not work if SDI were abandoned.

Arms control cannot succeed without SDI.

Daniel Graham is director of High Frontier Inc. and chairman of Coalition for the Strategic Defense Initiative.

NEW YORK CITY TRIBUNE 7 July 1986 Pg. 8

RALPH de TOLEDANO

Grounded Space Program Needs More Advocates Like Daniel O. Graham

WASHINGTON

When the Soviets put the first man in space, the American reaction was swift and positive. In a ringing speech, President John Kennedy demanded and got a space program which would put the United States on the moon.

Now, when Reginald Turnhill, editor of the authoritative *Jane's Space Flight Directory*, notes that the Soviets are so far ahead of us in space experience that "they are almost out of sight," the media and Congress grunt phlegmatically and call for a halt to our program because of the explosions on the Challenger and on two space rockets.

In answer to our timid and hemiplegic opinion-makers, Lt. Gen. Daniel O. Graham, former head of the Defense Intelligance Agency and now battling hard for the Strategic Defense Initiative, made a Kennedy-like response in a closely reasoned statement which was sent to the press and Congress. Because that statement did not receive the attention it merited, I yield to him (as they say on the floor of Congress).

Acknowledging that the Soviets have a 10-year lead in space, Graham notes that Turnhill "sees the Challenger accident as a disaster of bad planning, not technology. NASA's perfect record of flight safety was bound to be broken some day. The disaster was in having no alternative means of space transport. The fact that the United States is grounded is what gives the Soviets their lead."

And Graham continues: "Turnhill makes another point which seems to evade those opposed to the Strategic Defense Initiative. The proposition that space-borne defenses would 'militarize space' is ridiculous. Space was militarized when the first long-range ballistic missile was invented. It makes no more sense to leave ICBMs out of the category of space weapons than to leave battleships out of the category of naval weapons so long as they remain in port. Many anti-SDI polemicists would seem to believe that attack aircraft would not militatirize the air, but interceptors would. . . ."

"NASA can be faulted for creating the current dilemma, but Congress must share the blame. Short-sighted nickel-and-diming of the space program over a period of years led to compromises in design and the 'all our eggs in one basket' shuttle policy. This has got to stop now. . . . Space programs and SDI must be fully funded [if we are not to turn space over to the Soviets]. . . ."

"And the shuttle should fly again. Our shuttles are no less safe today than they were before the [Challenger] accident, and they should fly again with military crews and tighter safety rules. Military men are paid to take risks, and the nation's security depends on our getting back into space as soon as possible. We cannot afford years of impotent hand-wringing while the Soviets forge ahead. . . ."

"The time has come to pull the disparate parts of our space program together. Perhaps we need a Department of Space to provide some cohesion to the now scattered and wrangling elements of government charged with space activity: NASA, Defense, Intelligence, Transportation, Commerce and others. As responsibility for space is now distributed, space programs are viewed by large chunks of the bureaucracy as competitors for resources. What's worse, there is no comprehensive U.S. space strategy, military or commercial. . . ."

"On the military side, space-borne defense is obviously a competitor to more nuclear offensive systems. The sensor systems involved in space defenses are in competition with intelligence community plans for future reconnaissance satellites. Much of NASA sees SDI as a competitor with "peaceful uses" of space, and commercial efforts to get into space as a threat to bureaucratic controls.

"It's time for a change."

Dan Graham is, in a real way, our Billy Mitchell of space. He once said to me that in his battle to bring sanity and direction to our space program, he would have more trouble with the Congress than with the Kremlin. And he is right. For what you have is a bunch of senators and congressmen more anxious to hand out another five bucks in food stamps than to protect the nation from a Soviet nuclear assault.

Will he get through to the country? Maybe, but not as long as the goo-goos on the national media distort or ignore the facts.

Ralph de Toledano, a former editor with Newsweek, *has been covering news in our nation's capital for more than 25 years.*

WASHINGTON POST 2 July 1986 Pg. 21

Strategic Defense In General's Terms

Abrahamson: Deterrent Deals in Probabilities

Air Force Lt. Gen. James A. Abrahamson, director of the Strategic Defense Initiative Organization, met with editors and reporters of The Washington Post last week over lunch to discuss President Reagan's ambitious research program to develop a ground- and space-based defense against nuclear missiles. Excerpts below have been substantially abridged.

Q: Is SDI rightly conceived as a defense of the nation's population, or is it defense of the nation's military resources?

A: The way you ask the question and the way many people ask the question, it sounds like an either/or . . . . And it is part of this difficulty we always have when we're trying to explain the program and what we're trying to do. The critics, and even some of our friends who oversimplify this thing, like that TV ad that was not ours—we don't spend government money for TV ads, I hope you all understand that—have searched for a way to describe this . . . . What we have always been trying to do . . . . is to see if it's possible to find the means to build a layered defense . . . to try to destroy a missile when it first starts out . . . then subsequent layers in space and finally ending up with terminal layers . . . the ones that are just going to hopefully get the few that might leak through the earlier layers . . . . What we are talking about is layered defense and area defense . . . of not only the United States. We would like to be able to in fact convince the Europeans and ourselves that an area and a layered defense against shorter-range missiles in the theateris viable as well so that we again achieve someday an equal level of deterrence and defense capability against short-range threats as long-range threats, but now that's a different kind of problem.

Q: But if you're 50 percent effective in defending a missile field you've done something very considerable, [whereas] if you're 50 percent effective in defending Washington, you've done nothing.

A: Well, I guess I'd have to agree with that frankly at 50 percent but . . . that's why the layer defense is so important. Let's assume that each layer was only 50 or 60 or 70 percent effective, but if you had a series of five layers, the important thing is to the military planner—the general of the Soviet rocket forces who's putting his attack together in the first place—what you are trying to present him with is one of these probabilities problems . . . like rolling seven sevens in a row at Las Vegas or something like that.

What you want to give him is a problem that says he will never know . . . whether or not [his] missile will get through the first layer and whether or not its warheads will get to the second layer and that the warhead that you want to get to [a] particular target will be the same one that gets through the next layer and the next layer and the next layer. So . . . he never has any confidence that he will achieve his military objective and if he can't achieve his military objective . . . he will not take the risk of starting a nuclear war and that's the intent of defensive deterrence . . . .

When you deal in probabilities, particularly if you're going to do something like start a nuclear war, you are not going to just do what is my probability of getting through, you're also going to say what is my real confidence level that I am going to destroy the target—and that is, in a sense, not just what's my probability of rolling a seven on one roll . . . it's how many times must I roll to ensure that I get a seven. Okay? Now that's a very different number in probability calculation.

"What we are talking about is layered defense and area defense."

Q: If I'm hearing you correctly, what you're saying is you're trying to raise the doubt threshold in Moscow, to make it harder for anybody in Moscow to think that they can profit from launching an attack.

A: Sure, because we use a deterrent strategy and because they will surely . . . have an unacceptable loss in terms of their nation. That's the concept today, retaliation, and on a nice sunny afternoon here in Washington when we're not worried about anything . . . that's a very stable kind of structure and it's really fine. But imagine different circumstances. Imagine where, for whatever reason . . . there is a real crisis beginning to operate where one side elevates and then the other side elevates and what is the thought process that begins to go on and the thought process is: What are they doing? Are they go-

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TERMS...Continued

ing to strike? Should I strike first if it's inevitable that they're going to strike? So what seems stable now today and is kind of rather a placid situation may not be absolutely stable when the real crisis comes and when it really builds up . . . .

If anyone really believes and accepts the idea that what we have today . . . makes nuclear war impossible, absolutely impossible, then sure, we've got the right strategy and we ought to stick with it. I guess I'm not ready to bet on that.

Q: But we're still talking about going from today's situation in which the threat of retaliation is obviously very real and palpable and effective, to your tomorrow situation in which we've spent hundreds of billions of dollars and been through a whole new round of the game and we're still in a situation in which in which [deterrence], though modified, would work in exactly the same way.

A: It is a deterrent concept, defensive deterrent. But there are a couple of new elements in the game . . . . The question is even with a partial defense, do you add stability? And then if you get better and better defense, do you add more and more stability? And what happens to the whole structure and the whole relationship between the two nations as you begin to do those things? The assumption in the past has been no defenses. Why? Because at the time of the Antiballistic Missile Treaty—you know, that was an extraordinary experiment if you really think about it. I can't think of any other time in history where a nation has . . . said, "We will leave our people, everything that we believe in, our whole structure naked to the most dangerous weapons that man has ever been able to create." In order to do what? To create an atmosphere where their retaliatory capability would never be challenged. And hopefully if their retaliatory capability were never challenged, they would agree that there's some minimum number that we can all work to and we could stop. Did that work? I don't think so. My own personal opinion is it hasn't . . . . The next [issue] is defensive. We're not the only ones working in this area . . . . This is not a U.S. initiative. They [the Soviets] have believed in defense right from the very beginning. It served the Soviets from the days of the Tartars and the Napoleonic invasion, and that was the second major trend that the president was concerned with . . . not only air defenses against our bombers but missile defenses as well. And then it goes even further than that. They have over 3,000 hard sites for the defense of their leadership. Now,

"If you get better and better defense, do you add more and more stability?"

why would they bother doing all that? Because they want to fight and survive a nuclear war.

Q: If we can take out 80 percent of their warheads coming in and they . . . take out 80 percent of our retaliatory warheads, it seems to me just to kind of rehearse once again the basic process of deterrence, but you've spent hundreds of billions of dollars. And I don't see that you buy a lot more security.

A: Okay, but . . . your premise is the key here. Your premise is that they have kept all of their warheads or increased them and we've got 80 percent defense. That's not what we're trying to do. We're trying to modify their behavior. And that's what the president indicated when he said, let's see if we can make nuclear weapons, or nuclear ballistic missiles as the most dangerous of these, impotent and obsolete. Well, that's dramatic language, but what does it mean? It means take away the military value of these things . . . . Now, I offer as at least evidence that for the first time in the history of modern arms control we have probably the most serious proposal that we've really had on the table in Geneva now. Why do we have that there? Well, we didn't have that there just by being nice guys and saying, we really like you and let's have some cultural exchange programs. And now wouldn't you like us nice enough so that you will be willing to give up a bunch of the missiles which are, at this point, the omnipotent weapon . . . .

Q: So are you suggesting that the real purpose is not to build the system, but just to use it [as a bargaining chip]?

A: No. The real purpose is straightforward. Find and use every way possible: negotiations, a demonstration of resolve on the part of the American nation—and by the way, that's just as important as anything else—and, obviously, the ability to build defenses, to get them to say, "Let's reduce our number of missiles."

Q: General, last fall you were quoted as saying . . . [that] the ranks of opposition to SDI had been reduced to a few sincere diehards. In the last couple months there have been press conferences with scientists . . . . There were some fairly impressive minds among them . . . . And I wonder, is it still a few diehards? How do you assess that?

A: Well, I'm disappointed. I think we're beginning—we're losing a little bit. What we're seeing is that there has been an intensive campaign on the part of the opponent. They're going out there and they're signing up people. The U.S. government doesn't do that. We don't go out there and sign up people. So that's having a lot of impact. A lot of those people are people that obviously I would like very much to

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TERMS...Continued

have in favor of what we're doing .... [But] I think a lot of them don't understand what we're doing here. And I think that a lot of the argument—and here's something that I think is important—the argument is about what is the outcome of all this going to be? And that's an appropriate argument to have—we should have it, that's the right national debate. On the other hand, what we're doing today, in taking a step in that direction, is a different question. And few people have commented on, or really looked to say, what's the national poll on should we have a research program. And how many of these people are signed up to say, we shouldn't even do research. That's quite a different question ....

Q: How much of your job is generating public support?

A: Unfortunately more than I really would like .... But let me give you at least my bottom line judgment here, and you can be skeptical of this or not. The technical part of this is the easy part—it's not a piece of cake, but it's the easy part. The political side of it: If we don't have the defense sewn down, it's not because we can't do it. It's because the nation doesn't understand it sufficiently or we don't maintain resolve.

"If he can't achieve his military objective ... he will not take the risk of starting a nuclear war."

AEROSPACE AMERICA

July 1986 Pg. 9

Fading halo for Star Wars?

For the past three years, Star Wars critics have flailed away at every aspect of President Reagan's Strategic Defense Initiative (SDI), charging that it is destabilizing, that it threatens not only future arms control agreements but existing agreements with the Soviet Union, and that the obstacles surmounting it are so intractable that the U.S. could wind up spending $1 trillion and still be as open to ICBM attack as it is today.

All to no avail. Until now, skepticism about SDI had been confined to the academic community and to international policy experts. The critics could not mobilize public support against a plan which promised protection against the most fearsome weapons in superpower arsenals.

But things never stay the same in Washington. The critics have now found powerful support from an unexpected quarter, the Gramm-Rudman-Hollings Deficit Control Act of 1985. This act limits the allowable U.S. deficit to $144 billion in FY87. In compliance, both House and Senate have now approved budget resolutions that levy the heaviest spending cuts on the Defense Dept.

Lt. Gen. James A. Abrahamson has been trying to expand the SDI program at an annual rate of almost 100%. Congress voted $1.4 billion for the program in its first year (FY85) and $2.75 billion in FY86. Abrahamson is seeking $4.8 billion in FY87, plus another $603 million to support Dept. of Energy work on space-based nuclear power and underground testing of bomb-powered X-ray lasers, the most exotic of the anti-missile weapons.

The Gramm-Rudman budget has no room to accommodate such a fast-growing program, even if Congress were disposed to give it all-out support, which it is not. Last year, it lopped more than $1 billion from the president's $3.8 billion request for SDI, but the president was able to exempt it from the automatic 4.9% Gramm-Rudman cut in all government discretionary spending. But next year the president would not be able to exempt it in the event the automatic cutback provision of the act is triggered by a failure to hold next year's deficit to the target level.

Interestingly, SDI would be in trouble even in the absence of such an act. The program's demand for funds has grown so fast that it has begun to arouse second thoughts among supporters on the Hill and among elements of the Pentagon trying to press ahead on other R&D and procurement programs that do not enjoy the top priority assigned to SDI. Defense-minded Republicans such as Sen. William Cohen of Maine are beginning to express concern about the cost growth of SDI and its impact on other programs. At its present rate of buildup, Cohen complains, SDI will gobble up 15% of the Pentagon's R&D funds by 1989, curtailing its ability to continue modernization of both conventional and strategic forces. Gramm-Rudman may intensify SDI's squeeze on older, lower-priority programs. [In late May, in a letter addressed to Chairman Barry Goldwater of the Senate Armed Services Committee, 46 senators called for the scaling back of SDI funding, stating that: "By any measure, budget growth in the SDI has outpaced progress of technology and, more importantly, has begun to impinge on other military research and development."]

Systems that appear most vulnerable are those, like SDI, that would require sharply higher budgets: the C-17 cargo-tanker, the C-22 tilt-rotor VSTOL transport, the Midgetman ICBM, the Stealth bomber thought to require $1.7 billion to move it into full-scale production in FY87, and the Trident II SLBM, for which the Navy has requested $3 billion.

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HALO...Continued

All have constituencies in the Pentagon, the aerospace industry, and Congress. Recognition is dawning among them that SDI can no longer be regarded as a "special case," independent of more conventional strategic defense and R&D. Increasingly it is seen as a voracious money jaws, a privileged competitor to the older, less glamorous programs that threatens to destabilize the defense budget as much as Gramm-Rudman itself.

To his credit, the politically astute Gen. Abrahamson has seen the pitfalls SDI must negotiate. Though his mission is ostensibly conducting research to determine whether an antimissile system is feasible, survivable, and "cost-effective at the margin," Abrahamson has pursued a hell-for-leather wartime "crash" program, starting engineering development and test of components on a hard-driving timetable that will see many crucial elements of the system taking form and buying constituencies before the end of the president's second term in office.

Critics of the program want to defer work on elements of the system that promise earliest deployment while increasing emphasis on the more promising and technologically challenging elements of SDI, such as excimer and free-electron lasers, optical and surveillance technology, active discrimination of reentry vehicles from decoys, and ground-based lasers with pop-up mirrors. They would delay starting engineering development of terminal defenses based on endo- and exo-atmospheric missiles until 1988 or later in hopes of negotiating an arms control agreement with the Soviet Union, delay until the mid-1990s engineering development of any boost-phase intercept system to avoid conflict with the ABM Treaty, and de-emphasize work on kinetic-energy and chemical-laser weapons for boost-phase intercept, since almost everyone who has studied them has found that they would be defeated by fast-burn ICBMs and other countermeasures.

The critics are particularly exasperated at the "demos" Abrahamson has staged to promote SDI. Bouncing a laser beam off an 8-in. retro-reflector on the Discovery Orbiter, shooting down a working satellite in orbit with an ASAT missile, and destroying mocked-up missile boost stages, one with a chemical laser and the other with an electromagnetic gun, hardly confirm that SDI is moving ahead at the "incredible pace" claimed by Gen. Abrahamson, they contend. Not only do the devices in the "demos" fall magnitudes short of delivering the energies required of systems in real battle, say the critics, they beg virtually every question about how such weapons would be transported into space, guided against targets, powered, or maintained.

For Star Wars opponents, and for Gen. Abrahamson, the bottom line is what happens to SDI after Ronald Reagan leaves the White House. None of the likely Republican or Democratic candidates for president shares Reagan's boundless optimism about the potential of technology in general or SDI in particular. When the clock strikes noon on January 20, 1989, a new president will be sworn in, and SDI will be very much on its own as just one more supplicant for defense funding that must not be allowed to threaten other elements of the Pentagon program. Very likely it will be downgraded to the defense element of the strategic-weapons budget, in which case its money demands will be tested against offense claimants.

Lacking a Presidential imprimatur, SDI would very likely get picked to pieces by Pentagon analysts who would see that the widely-reviled doctrine of Mutual Assured Destruction continued to buy more U.S. security per dollar than any strategic defense. Arguments based on SDI spinoffs would carry no weight under Gramm-Rudman imperatives, which will become increasingly onerous as deficits get forced to zero.

If the program is to have a real future, Abrahamson must build it to a critical momentum as fast as he can before this president leaves office. A constricting budget is not his only problem. In recent months, he has become increasingly restive about nonbudgetary restraints. One is the administration's requirement that SDI conform to a "strict" interpretation of the ABM Treaty with the Soviet Union. Another is the requirement that SDI be "cost-effective at the margin"—cost the offense more for added missiles than it does the defense to defeat them.

Strictly interpreted, the ABM Treaty prohibits engineering development of space-based anti-missile weapons, and mobile ABMs in general, compelling the SDI Office to conduct costly small-scale tests to obtain results that could be gained more effectively with large-scale tests.

SDIO has now hit on an ingenious way to pit the strict interpretation of the Treaty against congressional budget cutters. It warns that failure to fund in full SDI's $4.8 billion request for next year may force it to tackle its R&D problems more directly and lead the administration to abandon its strict interpretation of the treaty even at the risk that the Soviet Union will then repudiate it.

SDIO is also trying to escape the cost-effective at the margin rule, the most onerous of the three "Nitze criteria" for judging whether the U.S. should deploy a population-defending anti-missile system contained in National Security Council Decision Directive No. 172. The requirement lends itself to "simplistic interpretation," SDIO officials complain, arguing that the U.S. may want to deploy defensive systems that are more costly, initially, at least, than Soviet countermeasures.

This latest turn in the SDI debate reflects a recognition by the program's most ardent boosters that the components of the system available for early development, such as space-based rocket-powered kinetic energy weapons and chemical lasers, cannot meet the criterion. Nevertheless, they want to press ahead as soon as possible on some sort of boost phase intercept for which such devices would be suited.

Such stratagems, however, will not thwart Gramm-Rudman nor a growing Pentagon backlash against SDI's hogging the trough. But the bottom line is the inauguration clock. Come January 20, 1989, SDI loses its most effective supporter, and for the first time will have to compete on even terms with other defense programs. It could even get bushwhacked. **Henry Simmons**

US Star Wars ambitions come down to earth

President Reagan was driven by a grand design when he launched his Strategic Defence Initiative three years ago. It was based on the idea of fighting enemy missiles in outer space.

The aim was to stop killing people in nuclear strikes and counter-strikes and to knock out lethal missiles in outer space instead. America, and maybe later Europe, was to become invulnerable to nuclear attack.

An interim SDI review reveals a sobering balance sheet. Major US population centres cannot be protected and America is unlikely in the foreseeable future to be able to station anti-missile systems in outer space in keeping with the President's high hopes.

It is not just a matter of the series of setbacks US space research has suffered this year, setting SDI back years: the Challenger mishap on 28 January, the explosion of a Titan rocket in April and the destruction of a Delta rocket shortly after take-off on 3 May.

Space transport vehicles that work are not all that is lacking. More important still, the most ambitious target of SDI, the destruction of enemy missiles during their take-off stage and over enemy territory, seems to be out of reach.

It could only have been achieved by stationing arms in space in such quantity and by dint of so great a technical and energy outlay that it would, according to official estimates, have taken over half a century of non-stop military space programmes, with at least 24 shuttle flights a year, plus payload rockets.

The men in charge of the SDI project may still sound a note of (guarded) optimism, but behind the scenes SDI has already been scaled down to what is feasible.

It has been reduced to ground-supported final phase defence against incoming missiles.

Space plans have in effect been abandoned, with the exception of killer satellites, on account of the enormous technical difficulties and costs that can no longer even be estimated.

Congressional defence committees of both the House of Representatives and the Senate have accordingly advised cuts in SDI funds.

That will have far-reaching consequences for the Fortress America idea. Effective protection of major population centres from enemy missiles will not be possible.

Always assuming that research projects are a success, protection could only be assured for strictly limited areas, such as missile silos, command centres or key military installations.

Final phase defence also shifts the risk of havoc being wrought by enemy missiles shot down from enemy territory to locations nearer one's own territory.

That puts paid to one of the main military objectives of the SDI programme, that of knocking out enemy missiles over their own territory, thereby striking a twofold destructive blow at the aggressor.

America remains vulnerable and may well be more vulnerable now than ever. While the Soviet Union deploys one medium-range and one mobile intercontinental ballistic missile after another, US plans for an effective second-strike ICBM are still no further than the drawing board.

The Minuteman, now nearly 20 years old, remains the backbone of America's strategic missile potential. There is no new ICBM, above all no mobile ICBM, yet in service.

All efforts have so far been concentrated on SDI, the worth of which may no longer be rated so highly by the next incumbent in the Oval Office.

SDI was supported by Henry Kissinger, for instance, who saw it as the only alternative to reliance on nuclear weapons. Besides, as long as it was still at the research stage, it could be used as a negotiating counter to force the other side to disarm in respect of offensive weapons.

President Reagan seems to have endorsed this reasoning and now makes it clear that he is prepared to negotiate with the Russians, if not about SDI research then at least about the stationing of anti-missile missiles in outer space.

The Russians have responded by offering in Geneva to reduce their offensive weapons, and that is surely an SDI success of no mean importance.

But even if the Russians have a healthy respect for the Americans' technological capability and are thus prepared to hold out the prospect of concessions they aren't blind.

They are naturally well aware that the SDI programme's negotiating clout is not what it initially was now technical and financial difficulties have arisen and Congress is less happy about the expense.

America has neglected the assured second strike concept, even abandoning it for a while, and concentrated on the SDI vision instead. It sought an alternative to the doctrine of mutually assured destruction, and for good reasons.

But it has failed to make the world safer as a result. Indeed, the strategic balance between the two superpowers has definitely tilted in the Soviet Union's favour.

Fritz Ullrich Fack

(Frankfurter Allgemeine Zeitung für Deutschland, 8 July 1986)

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GREGORY A. FOSSEDAL

While Soviets Deploy $6 Billion Space Defense, Proxmire Would Gut SDI

Critics of President Reagan's Strategic Defense Initiative (to shield the West from nuclear weapons) have dismissed the plan in vivid imagery as a "Star Wars dream." Ironically, it's the opponents who are fantasizing — most recently in an effort, led by Senator William Proxmire, a Wisconsin Democrat, to enact a virtual freeze on SDI funding.

Proxmire, joined by 45 colleagues, says he merely proposes to trim back what he calls an excess of money. Star Wars, he says, is "the biggest research program ever" and "the costliest project in the history of the United States . . . a constantly surging, ravenous shark consuming appropriations without end."

Proxmire has his figures wrong.

When John F. Kennedy took office, for example, the National Aeronautics and Space Administration was spending $967 million per year, for 1961. Kennedy, however, made a major commitment to land a man on the moon within the decade. By 1964, NASA was spending $5.1 billion: the program, in three years, had grown to five times its original funding.

By contrast, the Star Wars program spent $1.4 billion in its first full year, fiscal 1985, and requests (but won't get) $6.2 billion for 1988. Assuming Congress enacts not Proxmire's draconian cut, but a cut of about one-third as it has in the past, SDI will spend just over $4 billion in fiscal 1988. It will have grown by a factor of less than three.

Such growth is common for new programs. One organization that has been critical of the supposedly rapid growth in Star Wars, for example, is the congressional Office of Technology Assessment. Yet the OTA grew from $2 million in its first year, 1974, to $6.6 million two years later — faster than the Reagan initiative it now attacks.

Nor is America's present SDI effort the "biggest research program ever." Even without adjusting for inflation, NASA's annual budgets of $5 billion in the 1960s were greater. In 1965, NASA spent $5.1 billion; all the research and development conducted by the Pentagon, by contrast, was $4.6 billion, and the entire Defense Department budget was $49.6 billion.

True, Star Wars, as Congressman Charles Bennett, a Florida Democrat, put it, is "devouring 14 percent of the entire defense research and development effort." Yet that's about one-seventh the NASA level of the Kennedy era.. Where the Kennedy space program represented more than 10 percent of the defense budget, Star Wars this year will take up less than 1 percent.

A more important point of reference for our current strategic defense effort, of course, is the comparable Soviet program. In 1986, the United States will spend approximately $3.2 billion on all strategic defense efforts, including the SDI program, a beef up of our traditional air defense, and badly needed efforts to harden and protect U.S. intelligence satellites. In 1985, the Soviets spent an estimated $18 billion, according to figures derived from published Pentagon estimates.

Such figures have limited utility as a comparison of actual U.S. and Soviet capabilities. They do, however, cast doubt on claims that America's strategic defense program is obese.

There is one respect in which Proxmire is correct, however, and the Reagan Star Wars program is skewed. Of $18 billion in Soviet strategic defense spending for 1985, at least $6 billion, or about one-third, went to actual deployments. An equal amount was dedicated to actual development of systems, such as a space-based laser scheduled for launch in the next year, as opposed to pure, laboratory research. Similarly, by 1965, more than $500 million of NASA's budget, about one-tenth, was devoted to actual construction of facilities.

President Reagan, on the other hand, is getting almost no weapons bang for his research buck. Total procurement of strategic defense, air defense, and space defense systems for 1986 will be less than $200 million. There isn't even a line item for procurement of anti-missile defenses.

Yet lack of action is hardly the complaint being registered by Proxmire and other critics. Their goal is to bury Star Wars, not improve it. In their zeal to make sure SDI isn't started before Reagan leaves office, though, these critics are being less than fair with the figures.

When some poor government bureaucrat makes a similar distortion or error, he is likely to find himself in the headlines as the recipient of a "Golden Fleece" award from Proxmire. When it comes to Star Wars, however, it's Proxmire who deserves a woolly award — for creeping up on a vital defense program like a wolf, under a sheep suit of fiscal responsibility.

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NEW YORK POST 25 July 1986 Pg. 69

Star Wars going on bargaining table

By ROWLAND EVANS and ROBERT NOVAK

RONALD Reagan's reply to Soviet leader Mikhail Gorbachev's nuclear arms proposals will show that Secretary of State George Shultz has put the President's Strategic Defense Initiative on the bargaining table, a move the President had foresworn.

Despite contrary published reports, Shultz failed to get outright what he wanted: a 5-to-7-year U.S. pledge in Reagan's letter to Gorbachev not to withdraw from the Anti-Ballistic Missile treaty. What he got, however, could lead to just such a pledge in this fall's arms talks. SDI backers on Capitol Hill fear this will kill the defense plan, already under withering attack in Congress.

Thus, Reagan's strategic policymakers once again have overturned a well-defined presidential decision. That portrays their chief as a flip-flopper unable to stick to announced policy decisions and distressingly subject to desires of his most insistent ministers.

The long-awaited reply to Gorbachev does contain new and interesting ideas, including the first formal suggestion for U.S.-Soviet "sharing" of nuclear defense secrets (likely to be a non-starter). But the bottom line of the letter, slated for delivery by this weekend, gives Gorbachev what he most wants: a virtual concession that SDI has become negotiable.

That is perceived by Shultz as the key that will unlock Soviet missile silos for major reductions in their land-based "heavy" missiles. Shultz' opponents inside the administration — Defense Secretary Caspar Weinberger, CIA Director William Casey, arms control director Kenneth Adelman — warned that a flip-flop on SDI's bargaining immunity could cost heavily both in Moscow and on Capitol Hill. Reagan just listened, and did not reply.

Similar flip-flopping by the President followed his May 27 decision to declare the unratified, expired SALT II treaty a dead letter because of Soviet noncompliance. Within days, Reagan was persuaded by Shultz and the Europeans to say that the treaty might not really be dead after all.

Doubts as to what Reagan really intended persist to this day. That led a top diplomat of a NATO ally to tell us that American policy is written "with invisible ink."

Yet, as recently as the July 3 Statue of Liberty Dedication, Reagan seemed to have flipped back again on Salt II. He told French President Francois Mitterrand to tell Gorbachev that the U.S. would insist not only on compliance but verification of the old treaty in order to get a new one.

DEFENSE NEWS 28 July 1986 Pg. 16

SDI May Shut Nuclear Nightmare's Door

Vision Behind This Strategic Policy Deserves To Be Given a Chance

By JOHN F. MORTON

Far into the summer, Congress will be debating its defense appropriations and considering what cuts to make under the Gramm-Rudman-Hollings deficit-reduction law. This being an election year, defense policy will undergo even more intense scrutiny from both politicians and pundits eager to put on record all manner of theories and insights.

The American people must not let the clamor deafen them to the momentous discussion taking place over the future course of our strategic policy — specifically that charted by the president's Strategic Defense Initiative (SDI). The advanced technologies being researched under SDI may prove to be the key that will release humanity from its nuclear nightmare. If so, history will record SDI as this administration's most enduring and monumental legacy.

In the most general sense, the resistance to SDI may stem from the popular Western notion that the nuclear age is some sort of end point for human history. Until 1983, the nuclear era offered a fairly restricted set of philosophical options. The pessimists could only look at the grim possibility of a nuclear exchange and recoil in resignation and defeat before its apocalyptic finality. Some predicted a nuclear winter; a few prophesied the extinction of the human species.

More optimistically, others put great stock in the belief that nuclear weapons were the latter-day sword of Damocles that could mystically transform human nature and, by extension, abolish the institution of war. The idealists preached from the ramparts a doctrine of disarmament, while the realists in the corridors of power tinkered with the elusive implementation of arms control.

Fortunately, President Reagan did not feel so philosophically constrained. When in 1983 he imparted his vision to make nuclear weapons impotent and obsolete, he became the first Western leader to recognize that by technological advance, humanity could transcend the nuclear age. To do so required no utopian transformation of human nature and political behavior — just a faith in scientific progress, something very American.

Until sometime in the 1960s, the United States had a clear nuclear superiority. Deterrence was critical to our policy of containment, i.e., the containment of communism. Our nuclear arsenal was supposed to deter Soviet aggression, most especially as the bedrock of our guarantee to NATO collective security. When the Soviets be-

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gan to approach a nuclear parity, deterrence in this sense was no more. It assumed a new meaning under a strategic doctrine aptly known as Mutual Assured Destruction (MAD), or deterrence by the threat of retaliation.

In theory, MAD deters a nuclear exchange, more specifically a first strike, through mutual "consensual" vulnerability. Should one superpower launch a nuclear attack on the other, the latter will retaliate — thus establishing that a nuclear exchange will have no winner. Under MAD theory, deterrence cuts both ways.

To enshrine this doctrine, the superpowers signed the Antiballistic Missile (ABM) Treaty in 1972 that was supposed to guarantee that military targets and population centers would remain vulnerable and undefended, thus ensuring the success of a retaliatory strike (i.e. the deterrent).

Along with the ABM Treaty, the United States and the Soviet Union signed an interim agreement that was supposed to limit the deployment of new offensive nuclear weapons. Identified together as the Strategic Arms Limitation Treaty (SALT I), these agreements constitute the MAD methodology — arms control — whereby the United States and the Soviet Union were to regulate deterrence and the balance of terror.

The notion that the Soviets would ever accept verification is the primary flaw in arms control. Means can always be found to circumvent verification mechanisms and counter eye-in-the-sky technologies.

More to the point, proponents of verification ignore the context of superpower relations. The Soviet ideology is myopically hostile. Even so, MAD itself is a doctrine that is incapable of inspiring trust between the superpowers whether by choice or necessity. Indeed, the well-documented intrigue among bureaucratic constituencies in Washington over arms control has alone thwarted the policy. Arms control negotiations may be a worthy exercise, but they are certainly not a secure basis upon which to hang a policy.

The United States can easily argue that the deployment of 308 SS-18 and 360 SS-19 multiple, independently targeted, re-entry vehicle (MIRVed) intercontinental ballistic missiles (ICBMs) violates the spirit of strategic arms limitation. The MIRV capability of these missiles was added after the 1972 agreements.

Further, the development of the SS-25 and the MIRVed SS-X-24, both mobile, solid-fuel ICBMs, violates the letter of both SALT I and SALT II. Both missiles are new, highly accurate first-strike systems. As for exploiting some of the loopholes in SALT, the Soviets have liberally interpreted the definition of an intermediate-range missile in their deployment of the SS-20, another mobile, solid-fuel MIRVed weapon that threatens our NATO allies.

By comparison, the U.S. stockpile of nuclear weapons is 25 percent less than it was in 1967. The megatonnage is 70 percent lower. The United States has not built one new silo for its land-based ICBMs since the 1960s. We have upgraded our Minuteman missiles, but the modifications have been well within the spirit and the letter of SALT. The Minuteman IIIs were deployed from 1970 to 1975, and production was stopped in 1978. Minuteman III has three MIRVed warheads. The SS-19 packs six. The SS-18 packs at least 10.

As for defensive systems, the installation of the Krasnoyarsk radar together with the upgraded nationwide network of large phased-array radars gives the Soviets a battle management ABM capability that also clearly violates the letter of the 1972 treaty. The upgrading of the Moscow ABM system still is proceeding. By contrast, the United States has, against Soviet ICBMs, no strategic defense whatsoever.

Together with their offensive buildup throughout SALT, the Soviet defense initiative suggests one conclusion — they are seeking a first-strike capability and may in fact have it.

Article XV of the 1972 agreement allows both parties to withdraw if one "decides that extraordinary events related to the subject matter of this treaty have jeopardized its supreme interests." The Soviet attempt to seize a first strike capability is just such an event. Hence, the United States should consider abandoning the treaty and proceed with an alternative approach to strategic security such as the president envisions with SDI.

Anticipating this response, Soviet pronouncements claim that with SDI, the United States will be the first to "militarize outer space" with "space strike weapons" that they label a "space sword." The truth is that the Soviets have been researching advanced ABM technologies since the 1960s.

The fact that ICBMs will use trajectories in space to rain down their devastation is reason enough to argue that space is already militarized whether weapons are permanently orbiting or not. But to believe the United States will be the first to "militarize" it ignores the evidence of long-term Soviet military space activity.

The long-term goal of SDI is, as the president said, to make nuclear weapons impotent and obsolete. It may take a journey of a generation or more. But every journey, great or small, begins with a first step followed by another. In the process, we may progressively eliminate the threat of a nuclear exchange, if not nuclear weapons themselves. For the next few years, it is certainly worth fully funding the research to discover what works toward those ends and what does not.

MAD has institutionalized a militarily irresponsible situation — no defense. In the near future, more nations will join the nuclear club. Proliferation could unearth a trigger-happy regime unperturbed by deterrence. What then?

The vision behind SDI has the power to restore a realistic faith in both America and the future — not just for our citizens, but the world. SDI heralds the only strategic policy worthy of our American heritage and the responsibilities this present age has thrust upon us. It must be funded. It must be given a chance.

SANE WORLD July/August 1986 Pg. 3

The Fallout Dangers of Star Wars

by Dr. E.J. Sternglass

A technologically perfect missile shield that is capable of intercepting every incoming nuclear warhead would in all probability still fail to protect the US. No shield, no matter how effective, would prevent radioactive fallout produced in space from damaging all living things on our planet. Not only would bombs exploded in space drop radioactivity on earth — but the defensive system itself could add to the fallout.

The Pentagon is considering deploying hundreds, even thousands, of X-ray laser weapons, each of which would be powered by a hydrogen bomb explosion. At least half of the resulting long-lived radioisotopes (such as strontium-90, cesium-137, and plutonium-239) would disperse into our atmosphere. Several life-threatening results would certainly follow, including depletion of the ozone in the stratosphere. Ozone filters much of the sun's damaging ultraviolet radiation; weakening of the ozone layer would contaminate crops, livestock, milk, and water all over the globe, as well as produce blindness and skin cancer in epidemic proportions.

Even the "cleanest" H-bombs (those producing the least radioactivity) would inject into the atmosphere large quantities of radioactive carbon-14, which has a half-life of 5770 years. Linus Pauling and Andrei Sakharov both demonstrated in the late 1950s that carbon-14 is one of the most destructive radioisotopes because it damages the carbon present in all molecules, including in the DNA of genes. The two scientists calculated independently that a single one-megaton bomb detonated anywhere above the earth's surface would cause between 10,000 and 60,000 human deaths and a comparable number of serious birth defects, some of which would result in additional early deaths. Cancers and ordinary infectious diseases would be the main killers. Because the body's immune system is damaged or destroyed by radiation (as in the AIDS disease), those exposed might die from an infection as simple as the common cold.

Even if a Star Wars defense does not use such X-ray lasers, deadly fallout would nonetheless threaten us, for offensive missiles exploded in space would rain radiation on earth. Nuclear warheads can be designed to explode on sensing imminent destruction (sensors detect intense heat or fast-moving projectiles, and "salvage fuses" detonate the bomb), as Richard Garwin detailed recently in the *Journal of International Affairs* (Vol. 39, No. 1, 1985). Warheads might be equipped with this mechanism to enhance their destructive power in the face of a missile defense; for example, they could disrupt communications-and-control systems.

A space-based defensive system would pose radiation dangers just by being deployed — whether or not it was used. The hundreds of satellite stations necessary to fire missiles, lasers, and particle beams and to coordinate battle would require highly powerful energy sources, small and lightweight. A nuclear reaction is the only known means of producing energy at that level of efficiency. Theorists such as Eliot Marshall envision numerous multi-megawatt nuclear reactors orbiting in space. The dangers of reactors on earth, constantly monitored and adjusted, are familiar, but imagine the difficulty of maintaining them in space. If an accident occurred — or if some force deflected them from their regular orbits, causing them to burn up — vast amounts of radioactivity could descend to earth.

Most experts foresee grave, perhaps insurmountable, problems in developing a missile shield to defend only a limited number of military sites. But if scientists somehow succeed in building a system that protects ground structures from destruction by blast, fire, and heat, the shield will not protect life on the planet. Radioactive fallout would most likely devastate the environment and the human race.

E.J. Sternglass, Professor Emeritus of Radiological Physics at the University of Pittsburgh School of Medicine, is the author of Secret Fallout *(McGraw-Hill, 1981), a study of the widespread illness and death caused by nuclear power plants and weapons production and testing.*

HUMAN EVENTS 9 August 1986 Pg. 7

SDI Facing 'Death by Research'

By M. STANTON EVANS

Opponents of President Reagan's Strategic Defense Initiative are perilously close to defeating the program—if they have not done so already.

Most of the attention given to this subject has focused on funding battles in Congress and the direct assault of the more vehement critics of the Administration. The authentic danger to SDI, however, has never stemmed from these more obvious sources. The President's notion of defending ourselves from any sudden barrage of Soviet missiles has too much political appeal for a head-on attack against it to be successful.

Foes of SDI have sensed this problem from the outset, and have accordingly phrased their opposition in oblique and guarded fashion. They have suggested the idea of space-based defenses, while theoretically interesting, would be technically unfeasible, prohibitively expensive, unpredictable in its impact on the Soviets' behavior, and so on.

By far the most effective opposition, however, is less direct than any of these — a strategy of apparent *support* for SDI, but within a framework of constraints, provisos and delays insuring

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DEATH...Continued

that it won't become reality. In this approach, SDI could be "researched" indefinitely, with fairly substantial funding, plenty of official lip service, and occasional reports about its progress. It would simply never be deployed.

That death-by-research is the most likely fate of SDI is indicated by a host of factors. It is the tactic being pursued not only by the more subtle critics of the President, but also by the Reagan State Department. In addition, it is all too clearly the favored stratagem of the Soviet Union—which obviously thinks that SDI is very feasible indeed and wants to get it bottled up. This is a formidable array of forces at work to suffocate the program.

The key to this negative strategy is the ABM treaty of 1972, which bars the deployment of U.S. defenses against incoming Soviet (or other) missiles. The ABM accord is the embodiment of "mutual assured destruction" (MAD), which says it is a good thing for civilian populations to be left exposed to potential nuclear onslaught, since this creates a "balance of terror" and therefore peace. This doctrine is responsible for our current absence of all homeland defenses, and consequent vulnerability to attack.

As the ABM accord embodies MAD, so strategic defense as proposed by Reagan would repudiate it. If Reagan is successful in promoting SDI, a strategic revolution will be accomplished, and Mutual Assured Destruction and the ABM accord will go by the boards. Conversely, if the ABM agreement can be kept in place and its constraints against field testing and deployment strictly enforced against the United States, SDI can never be anything more than an expensive science project.

That is why the Soviets have countered SDI with a proposal to strengthen the ABM accord, making it much more difficult for us to evade its terms. Under the language of the treaty, which is otherwise perpetual in duration, we can renounce it by giving six months' notice that it endangers our "supreme interests" (which it certainly does). The Soviets want an agreement that there will be no renunciation for another 15 to 20 years — the obvious purpose of which is to make sure we can't deploy SDI or its components.

You might suppose that so transparent an effort to thwart a major defense initiative of the Reagan Administration would be instantly detected and resisted by the Reagan State Department. Quite the opposite, however, has occurred.

Bemused by arms control dogma and the alleged virtue of agreements with the Kremlin, State has seized on the Soviet proposal with great alacrity, and is now promoting its own particular version of consigning SDI to the limbo of "research" while locking us into the ABM accord for another five to seven years.

These maneuverings came to fruition last week as the President reportedly agreed to a U.S. negotiating position that would bind us to the ABM accord well into the 1990s while contining to "research" SDI, in exchange for substantial cutbacks on offensive arsenals on both sides. This is being advertised in the press as a "grand compromise," but it is in fact no compromise at all. It is instead a major and possibly fatal defeat for SDI, and a stunning triumph for proponents of MAD theory.

Such a negotiating posture will not only keep SDI confined to the closet of "research" for an indefinite period, it will also increase the already serious problems involved with any future break-out from the ABM accord. By enshrining this misbegotten treaty as the centerpiece of our dealings with the Soviets, we enhance its spurious prestige with the public and obscure the enormous danger that it poses. The resulting difficulties may be inferred from the current debate about renouncing the SALT II agreement — which was never even ratified.

What we ought to be doing is, in all respects, the opposite of this. As argued by Rep. Jim Courter (R.-N.J.), who is rapidly emerging as a major leader on such issues, we should repudiate MAD and the ABM accord, then push ahead as rapidly as we can on SDI, not merely as a futuristic research project, but as a series of technologies that will be deployed, each in its turn, as soon as progress warrants. In other words, we should do on this front what we have always done when the imperatives of self-defense and the capabilities of military science defined our policy.

At the moment, however, our strategy is being dictated by arms control theology and by its legal icon, the ABM accord. Rather than overturning MAD theory, the SDI program is in real danger of being absorbed into it, consigned to a chamber where it can spin out the years in endless "research" while America is left defenseless. ■

FREE PRESS INTERNATIONAL, Vol VI, No. 14 2 July 1986 Pg. 1

Superpowers Developing Robotic Warriors

The "soldiers" fighting in 21st-century wars are likely in crucial instances to be automatons and robots. They could safely pass through nuclear-contaminated areas and "shoot" straighter than any human soldier. Both superpowers are conducting R&D for such high-tech battlefields, according to defense specialists.

Without doubt, battles in near-Earth space will be fought with unmanned machines that either are guided from the ground or "fly" themselves. But military scientists also project high-tech "automaton combat" on land and at sea as well as in the air and near-Earth space.

The Soviet Union, say trusted experts, already is developing or deploying battlefield automatons and robots.

Dr. **John R. Collins**, respected Library of Congress military researcher, writes in the

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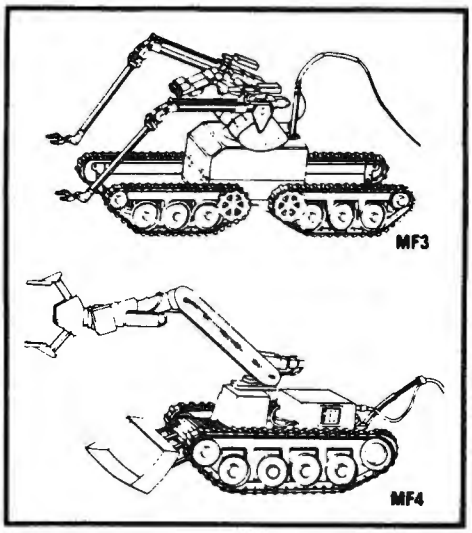
recently-published volume *U.S.-Soviet Military Balance 1980-1985* that the Soviets are now building and testing:

- Land- and air-mobile robots
- Robot-handlers of dangerous munitions
- Wheeled, tracked, and walking robots that are able, among other things, to sow mines, clear minefields, assault fortifications, and install bridges under fire
- Various "Star Wars"-related, autonomously-acting "smart" space vehicles

- For the aerial medium, autonomous vehicles (AV) that fly themselves and "maneuver" autonomously — "drones" that can carry out reconnaissance as well as act as weapons in the form of pilotless, remotely-piloted vehicles (RPV)

In some of these areas of robotics research and development the United States and the Soviets are running neck-and-neck, Collins says, while in others the Soviets appear to hold the lead.



West German-made robots — using TV cameras, microphones and geiger counters — can operate in high radiation areas.

In their reports to the Central Committee on the Soviet economy last month, General Secretary **Mikhail Gorbachev** and Premier **Nikolai Ryzhkov** referred to the party's plan to make radical, sweeping application of robotics to civilian industry.

In these and past reports, moreover, references have appeared linking robotics to the defense industry and to applications in war. Soviet experience shows that the defense industry gets first choice in the latest labor-saving, precious machines in the production process.

It is further noted by experts that the majority of all Soviet engineering degrees relate to military engineering, which is the field most closely linked to robotics.

Most authorities agree that a robot is a special adaptation of "artificial intelligence" (AI) to the performance of heretofore human tasks and missions. Robots carry out the humanoid activity automatically, autonomously, and with some degree of mobility by "smart" machines. Such a robotic device will likely exhibit a degree of intelligent "choice."

Based on this generalized definition of robots, robotics engineers single out four types. They may be scaled, bottom to top, in terms of their humanoid "sophistication" as it bears upon performing either civilian or military tasks.

First, at the bottom, is the most primitive type. These are the "unintelligent" robots that do their work manually in mostly unstructured environments which do not lend themselves to pre-programming. These environments, too, are unsuitable for human workers, either because of extreme danger at the work place or the arduousness or tedium of the labor. Such robots require a human operator maintaining direct control of the robot's work.

The second-most-primitive robots are a type of "untintelligent" pre-programmed machines. Operating in highly structured work situations, these robots are equipped to carry out by themselves repetitive tasks, "mechanically." They are most adaptable to assembly lines, including those in defense factories, according to Soviet literature.

The third, or second-most-sophisticated type of robot is "semi-intelligent," a major step above the lower type. This robot possesses a small computerized "brain." This is known in Soviet military literature as its "artificial intellect" (*iskusstvennii intellekt*). With its AI, it can make a number of independent "decisions" with some degree, at least, of autonomy. Depending on cues (data) reaching it from the environment, not from a human operator, it will act "intelligently" and adaptively in changing environments.

Finally, the most humanoid type of all robots — the ones having a bright future awaiting them in the 21st century — largely act by their own "wits." They can "fly" an airplane or spacecraft. They can maneuver the craft into various attitudes depending on changes in the environment and on the nature of the missions.

Whether fighting on the ground or at sea, in the air and in space, such robots can "choose" to abort a mission if their sensors pick up data requiring a "destruct." Or they can execute some abrupt, radical change of "plans" as their sensors direct. These robots' "repertoires" of alternative behaviors could be quite broad, depending on the sophistication of their microcomputer circuitry.

For example, the robots might display a relatively broad diapason of "choices" in terms of avoiding detection or destroying an enemy. For the latter, they might incorporate certain suitable ordnance with which to accomplish a given mission. Or they might choose alternative targets when priorities have to be changed. Enroute to target, if they are semi-autonomous, they might turn on or off their links to human monitors. In the "off" mode, they would be able, for the sake of stealth, to elude the enemy by means of on-board electronic countermeasures (ECM) while also providing electronic counter-countermeasures (ECCM) against the enemy's countermeasures.

Turning to cis-terrestrial space, a somewhat different picture of robotic warfare is presented.

Here a full-fledged "Star Wars" scenario of hypersonic automatons grappling with their opposites at 500, 1,000, or even over 22,000 miles above the Earth is feasible. It is assumed that deployment of a fully matured "High Frontier"-type space defense is in place.

A multi-tiered space-borne defense has been erected with sufficient protection against other spacecraft. Such threats include anti-satellite (ASAT) killers or laser- or particle beam-carrying space destroyers. These offensive strike weapons, seeking to penetrate the defense, could presumably in large part be frustrated.

The perfected system would provide boost phase, post-boost phase, mid-course phase, and terminal phase defensive sensors and weapons which would be in orbit and functioning effectively. Some of the mechanisms would be semi-autonomous, others fully "willful."

The same applies to ground-based defenses against attacks originating in space. Ground controllers would give the space-launch commands to the space-borne automatons. These would be "intelligent" enough to take evasive action or to discriminate and close in on their targets in the highly structured environment of cis-terrestrial space.

Space battle station-basing of humans and/or robots also could facilitate launching of "Star Wars" machines. It would also allow for human intervention in cases where the semi-autonomous vehicles require a higher degree of intelligence than the AI designed into them can provide. Robots could also act as "redundancy" systems, taking over as "backups" where mortal humans fail.

Today military magazines are replete with news about robot counter-mine vehicles, robot assault rifles, robot assault boats, robot smoke-dispensing units and robot evacuation vehicles.

Such systems today are being studied, for example, by the Army Artificial Intelligence/Robotics steering group, established 5 years ago. Its mission: to enable humans to perform more efficiently through augmenting human-soldier activity and work by means of robotic subsys-

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SUPERPOWERS...Continued

tems, utilizing all kinds of autonomous vehicles (unmanned tanks, for instance) and other mechanisms.

In many ways, the Soviets some time ago have let the cat out of the bag with regard to their intentions concerning robotics.

The November 1970 successful launching and landing of Lunakhod on the moon is an example. Here was a nearly autonomous, "intelligent" machine unleashed dramatically on the moon and "driven" by absent humans located 1.5 seconds of communications time back on Earth.

To us it seemed that the Soviets with their Lunakhod regarded our natural satellite as a place where humans feared to tread. Or, as suggested by some space experts, the real reason that the Soviets developed Lunakhod was to inaugurate and advance Soviet robotics in this somewhat (to us) bizarre fashion. Former NASA expert on the Soviet space program, **James F. Oberg**, says that we can expect more instances of robotic use in space as the Soviets continue to build up, Erector Set-like, their Salyut space station.

Moreover, Oberg and others maintain, Soviet "Star Wars" R&D is some distance ahead of the U.S. R&D counterpart, Strategic Defense Initiative. The Department of Defense says the lead stems in part from the fact that Soviet robotics is keeping up with developments in other related fields, including computers. One thing is certain: Neither side can complete its space-defense system without well-developed automation and robotization.

WASHINGTON POST 7 July 1986 Pg. 11

Rowland Evans and Robert Novak

GOP Pressure on SDI

The arms control lobby, oiled by Republicans who care less about nuclear talks than stockpiling political assets for the election campaign, is fashioning an offer for Soviet leader Mikhail Gorbachev: a five- to seven-year U.S. pledge not to withdraw from the Anti-Ballistic Missile Treaty.

The concern of arms control skeptics who regard the SALT treaties, including ABM, as Trojan horses, is that President Reagan might accept such a noose for his Strategic Defense Initiative without realizing its terminal potential.

"White House aides are pushing this [the no-withdrawal pledge]," one arms control authority told us. They are doing so with assistance from political operatives and candidates who have no special love for arms control but are desperate to continue Republican control of the Senate by exploiting U.S.-Soviet harmony this fall capped by a post-election summit.

Their allies are Gorbachev's beguiling propaganda, the domestic arms control lobby and some NATO allies. Hard-liners, reflecting what has been the president's own conviction, predict that if the present ABM treaty is modified to accommodate Soviet fears of strategic defense—Reagan's No. 1 military objective—SDI will erode. Once erosion starts, they insist, it cannot be stopped.

Evidence is at hand. It took more than five years before the president could override détentist diplomatic advisers and renounce SALT II, despite many formal U.S. charges of Soviet violations. Even though the treaty was never ratified—and actually expired last winter—pressures not to undercut it were irresistible until the middle of Reagan's second term.

As of now, the ABM treaty gives either side the right to withdraw six months after serving notice. Gorbachev's brilliance in selling the Soviet viewpoint and exploiting the negotiating weaknesses inherent in any democracy is recognized and feared by Reagan's top strategists. Gorbachev has asked for a 15- to 20-year freeze on the ABM treaty. But a five- to seven-year moratorium would put his disabling foot on the neck of SDI, the system that Reagan claims may in time place the U.S. beyond Soviet nuclear threats.

In return, Gorbachev offers nebulous reductions in the particular Soviet arsenal that is taking on characteristics of a first-strike capability: land-based heavy missiles.

This is the old Soviet game of defense-offense trade-offs: the United States renounces or scales back on defense, and the Soviets do likewise on offense. In fact, however, in return for major American concessions on antiballistic missile defense 15 years ago, the Soviet response in reducing their offense is still awaited.

Instead, long before Reagan finally said the United States was no longer bound by SALT II, Moscow was producing mind-boggling new land-based systems such as the mobile SS-25, declared by the United States to be a violation of SALT II. High administration officials tell us that no fewer than 72 SS-25s, grouped in roughly eight separate bases, are now deployed—with an expectation of double that number a year from now.

Even on the defense side the Soviet Union has been taking advantage of the United States by violating the ABM treaty, including the illegal radar it has placed near Krasnoyarsk.

On a brief visit here last week, no less an authority than the new French defense minister, Andre Giraud, emphasized what pro-ABM arms controllers sometimes forget: that "the Soviets have . . . made considerable efforts on defense and seem to be going on with them"—possibly, he deliberately implied, in violation of the ABM treaty. He dismissed as contemptible a suggestion that the United States might also be violating the treaty.

A five-year pledge to abide by that treaty might be marginally acceptable to SDI managers—if they could believe the Soviets would modify the treaty to accommodate testing and other nonresearch functions, and if they could also believe that the moratorium would not be extended.

That would be the method of selling the president on the moratorium. One can anticipate silken words as the argument builds to give Gorbachev only a small slice of what he wants, assuring a cozy summit mood for Republican success in November: your SDI, Mr. President, will not be burdened by such a short time constraint, and it may bring big reductions in their land-based heavies.

The issue comes to a head in the White House within the next few weeks. If the president is persuaded to give up the U.S. right to get out of the ABM treaty on six months' notice, rough agreement hailed as the foundation for a new arms treaty could be reached just before the Nov. 4 election—the end of the next session of the Geneva arms talks.

That could indeed make an election night for Republican partying. It could also bury SDI, the sharpest bargaining chip the United States has.

DEFENSE SCIENCE & ELECTRONICS July 1986 Pg. 11

Considering critical commentary raises questions

SDI: soft? where?

by Dr. Yale Jay Lubkin

As a general rule, experts aren't.

Physicians are trained to be authoritative, not right, and an adventurous physician's dissent from medical orthodoxy is punished as severely as Galileo's from religious orthodoxy.

There is a scientific orthodoxy as well. And there should be, for the same reason that there should be a medical orthodoxy. Many people believe just about anything, no matter how ridiculous. And many other people are out to sell anything, no matter how absurd, if they can find a buyer. So you have the flat-earthers, the leeches, the inventors, inventors of perpetual motion machines and the snake oil salesmen.

Establishment orthodoxy protects against the charlatans and the sincerely inept, of which there seems to be an endless supply. But it also guards the gates against the Semmelweises and the Wrights and the Paulings, even to the extent of murdering them.

Recent evidence indicates that Ignacz Semmelweis, who determined that unsanitary physicians caused pueperal fever, then embarked on a long and unsuccessful campaign to get physicians to wash their hands, was murdered by having his head bashed in. The autopsy was faked by his colleagues in Vienna.

Now, our orthodox scientists—at least in the West—do not go for physical murder, but they do go for killing careers. Two recent examples were Emanuel Velikovsky and Stanford Ovshinsky. Despite a long friendship with Einstein, Velikovsky was hounded and pursued. Ovshinsky's ideas on amorphous semiconductors were vilified, ridiculed and correct.

Einstein himself went through this process. While his theory of the photoelectric effect (1905) was readily accepted and won him the Nobel Prize, his Theory of Relativity received harsh public criticism. One of Einstein's staunch supporters was Sir Arthur Eddington. He expanded on relativity, but came under attack for being a mystic and numerologist. He still is under attack, somewhat, even though his numerological derivation of the fine structure constant proved more accurate than contemporary measurements.

SDI's turn. Attacks on SDI have shifted from hardware ridicule to political ridicule to the current software ridicule. The continuing constant can be summed up in the SIPRI philosophy: "If the Soviets add to their armament, it is good for peace. If the US adds to its armament, it is good for war." A leading exponent of this approach is MIT's Kosta Tsipis, who has been given forums in such left-wing journals as *New Scientist*.

The leading scientific exponents of the "software is impossible" school are Richard Garwin and David Parnas. A report in the *American Scientist* said: "On 28 June 1985, David Lorge Parnas, a respected computer scientist who has consulted extensively on United States defense projects, resigned from the Panel on Computing in Support of Battle Management, convened by the Strategic Defense Initiative Organization (SDIO). With his letter of resignation, he submitted eight short essays explaining why he believed the software required by the Strategic Defense Initiative would not be trustworthy. Excerpts from Dr. Parnas' letter and the accompanying papers have appeared widely in the press."

The implication that software systems will always be unreliable is not true.

The papers were disseminated through the government's Arpanet and were reprinted in the September/October issue of the *American Scientist*. The papers are not particularly scientific. They reflect Parnas' opinions rather than proofs. Parnas' stature as a computer scientist requires that these opinions be taken seriously and examined.

The first essay is titled "Why software is unreliable." The basic argument is that most engineering deals with continuous functions while software deals with discrete states. Most programmers are not competent, and thus there are few well-structured real software systems.

All of this is true. The implication that software systems will always be unreliable is not true.

The brain, human or otherwise, is a discrete state system which works with continuous state components to produce complex sensor/logic systems. These systems work well, even on the scale of an inchworm. The worm rotates its sensor, searching to define the safe boundaries of its domain. It can learn to proceed rapidly on a safe path and not at all on a boundary discontinuity.

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QUESTIONS...Continued

Some of these brains, like that of Dr. Parnas, can function quite well, if not in real time for all problems.

The second essay predicts why the SDI software will be untrustworthy. The problem is that the problem is complex, the equipment is complex, the decision time is short, there is little possibility of human intervention and no possibility of debugging and the pieces of the total weapons system are many, somewhat autonomous and not well-defined at this time. Furthermore, we have never done anything like this before.

These problems are expanded and expounded, and Parnas' conclusion is that the problem is so big that we will never be able to believe—with any confidence—that we have succeeded in making a system that works. Therefore, nuclear weapons will remain a potential threat.

Again, the arguments are correct, but the conclusion is wrong or a nonsequitur. Nobody believes that nuclear weapons will ever cease to be a potent threat, at least prior to the destruction of the planet or the emigration of large numbers of people to other solar systems (which is a compelling reason to step up space exploration). Nobody believes that cancer will be cured soon or that heart attacks can be prevented. But this is no reason for stopping medical research and treatment, even if one believes that most physicians are incompetent. Well, at least as incompetent as programmers are.

In 1958 and 1959, I was responsible for the system design of the AN/ASD-1, the most complex electronic intelligence system attempted at that time. It was big even by today's standards, and it took up the entire interior of a KC-135. Many problems disturbed me, the same sort of things that now disturb Parnas.

We had the capability of collecting data on several million radar pulses per second, and had no way of processing them all. I could think of many possible radar designs which we simply could not analyze. The system was built anyway and it did useful work for many years.

While still working on ASD-1, I came up with an idea which now is called an RF channelizer. Others came up with the same idea, and now channelizers are quite common in systems which must work in dense environments. The channelizer splits up the spectrum into bands which are processed in parallel. Then it adds an order of magnitude to the signal-handling capability of the system.

A year later, I designed the first ELINT system to use high-accuracy direction-finding antennas, and proposed it to the Army Security Agency. It eventually was built (by companies other than the one I was working for at the time). The idea of using high-accuracy direction-finding added somewhat more than another order of magnitude to the signal-handling capability. Through the years, other people generated other ideas on processing the signals. Today, systems like Litton Amecom's ADVCAP are being built. They are much smaller and simpler than ASD-1, but can get better results in much higher density tactical environments, under much worse conditions.

Parnas' second argument is a denial of the possibility of evolution.

Unreliable programs? The third essay argues that conventional software does not produce reliable programs. The arguments are plausible. Parnas' conclusion is that a drastic change in methods is needed. Probably true. And, because of a wide awareness that a drastic change in software technique is needed, effective changes in software technology certainly will occur.

Organizations like DARPA and SDIO recognize the need, and are doing something about it. Ada, one of several available first steps, is being widely supported even though—or, perhaps especially because—few programmers are skilled in the art.

DARPA is funding construction and distribution of a quantity of butterfly array processors, so that people can learn to think in arrays. The butterflies are constructed of two to 256 identical processors, which can work on problems in clusters.

Scores of Cray supercomputers are now working. My son, an expert on large data base management at Lawrence Livermore National Laboratory, has four to work with. Ten years ago, there were no enormous data bases managed by computers. Ten years from now, there will be lots of clever people who can program multiprocessors in much better ways than we can now, and maybe even some computers that can do the job.

Parnas' fourth essay discusses limits of present software engineering methods. In sum, software engineering is tough and most programmers do not use the fund of available knowledge. Some methods can be used to make things better, but they have not been tried extensively. Good software engineering is tough, and Parnas is not good enough to build the SDI software system. All true.

But Parnas does not expect that anyone else will be good enough to do it either, and this is almost certainly not true. In 1895, the head of the US Patent Office recommended that the office be closed because everything useful which could be invented had been. Parnas says, "I am not a modest man." Perhaps he should be, at least a little bit.

The next target is artificial intelligence and SDI. Parnas starts his kiloword discussion by warning us not to expect much from AI. He closes by saying that artificial intelligence is to intelligence as artificial flowers are to flowers. Very clever, but he might have added "and as intellectual is to intellect."

AI may or may not be useful. Deodorants may or may not be useful. But the technical decision to go ahead with SDI is totally independent of either AI or Sure.

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QUESTIONS...Continued

Automatic programming is the next straw man to be knocked down. The arguments are sort of wishy-washy. The best of the bunch is that people make mistakes in writing non-algorithm specifications just as they do in writing algorithms. What's new?

Back around 1958, Gene Fubini told me that I was intuitively right 80 percent of the time, but he was very nervous about the other 20 percent. I then wrote an article ("It Doesn't Pay To Be Perfect," published in *Electronic Design* around 1961), which showed that under some reasonable conditions of cost and payoff, the optimum strategy was to be correct 80 percent of the time. For something as important as SDI, the payoff may be highest at 99 percent correct, but you can find my article and plug in your own set of numbers.

The seventh essay asks, "Can program verification make the SDI software reliable?" Any mathematician who has heard of Godel knows the answer to that.

Parnas makes the case that we cannot prove that a large program is correct. "It is inconceivable to me that one could provide a convincing proof of correctness of even a small portion of the SDI software," he concludes. "Given our inability to specify the requirements of the software, I do not know what such a proof would mean if I had it."

But why limit oneself to software? Godel showed that it is impossible to prove the consistency of any of the numerous non-trivial branches of mathematics. And it is certainly impossible for us humans to prove the consistency or completeness of physics. Worse, we can be fairly sure that our theories of physics are incorrect. Nevertheless, we risk our lives daily with devices, such as cars, bridges and airplanes, which have been designed using theories we know to be incorrect. The Egyptians built the pyramids despite their firm conviction that pi equals three.

Parnas expresses bias. The closing essay is a totally unscientific ad hominem attack on SDIO. "Is SDIO an efficient way to fund worthwhile research?" (Need I tell you the answer?) One wonders what insult someone there did to Parnas to justify such vitriol.

Parnas doesn't like bureaucrats. I don't either. But the problems of bureaucracy are the problems of civilization, not of SDIO. Either we replace lots of bureaucracy with a modicum of common sense or bureaucracy will destroy Western society as it has destroyed the Communist, Mandarin and Byzantine societies, and all others in the past.

Let's fight the bureaucrats who drown us with mindless rules. And, remember, as bad as our rules are, the ones that the Soviets would impose on us would be much worse.

Common sense seems to be lacking in Parnas' arguments, which is a shame because he seems to have brains somewhere. But in the past year, logic seems to have been replaced by the snide remark and the personal attack.

In mid-December, there was a "debate" on SDI at Stanford University. It was sponsored by Computer Professionals for Social Responsibility. (And I always though that CPSR meant "Communist Party of the Soviet Republic.") Pro-SDI were Maj. Simon Worden of SDIO and Dr. Richard Lipton of Princeton. Opposed were Parnas and Garwin.

These two bastions of our academic traditions, Parnas and Garwin, were flippant and sarcastic. They poured out factual error by the bucket. Parnas called his opponents "SDIO lackeys futilely defending the teflon umbrella proposed by our teflon President." Garwin kept harping on "revisionist thinking" within SDIO.

At one point, Garwin claimed to have no knowledge of the capabilities of X-ray lasers to partially penetrate the atmosphere. He was challenged from the floor by Dr. Lowell Wood of Lawrence Livermore. Wood said that he had personally conducted the classified debriefing in which Garwin was provided with the very information he claimed not to know.

Garwin's reply: "I don't always believe what I am told." That seems to be a perfect philosophy with which to regard the shrill outpourings of the anti-civilization ranters. And it leads naturally to the question "Why are they doing this?"

SDIO is not the only organization trying to make programming more of a determined and scientific art. The Japanese are busy with their fifth-generation machines, and work is going on all over the United States. Typical is a $2.6-million contract recently awarded General Electric by the Air Force Avionics Laboratory at Wright-Patterson AFB, OH.

The GE effort is a three-year task to develop a computer program which will streamline the writing of programs in Ada. The program will have built-in expert systems to guide the programmers through the steps needed to generate an Ada program to do what the programmer wants. It will have editors to cut the time it takes to write program. It will be able to generate Ada code from flow charts. The machines may not be able to write their own programs, but they certainly will make it easier for humans to write them.

Despite the dire warnings of Parnas, Garwin and the other neo-Luddites, computers do work.

Each Space Shuttle flight is supported by about 10 million lines of program. It is reasonable to assume that not all of them have been 100 percent checked, and that not all of the programming works exactly as intended. But when we lost the *Challenger*, it was because a rubber gasket was faulty, not because the software was too hard. ●

***Dr.* Yale Jay Lubkin, the director of advanced technology for a major EW manufacturing company, is our Electronic Warfare Editor.**

EDITORIALS

Reagan Defense Priorities Wrong

WICHITA EAGLE-BEACON

6 June 1986

PRESIDENT Reagan says anyone who wants to cut the defense budget should "tell it to the Marines." What the president didn't tell a leatherneck audience Wednesday was that his military priorities don't include conventional forces, such as the Marines.

The House and Senate have approved Pentagon budgets less than that sought by Mr. Reagan. Realizing he won't get all he wants, the president recently told Congress which programs he considers most vital. Top priority goes to nuclear weapons and the Strategic Defense Initiative. Spare parts, training and personnel costs would bear the brunt of lower defense spending.

Mr. Reagan is partly responsible for less military spending. He signed the Gramm-Rudman law that mandates equal cuts in defense and most other government programs unless other ways are found to lower the deficit. The president, however, has opposed the higher taxes that would be necessary to meet deficit goals and increase defense.

The president is making a bad choice in emphasizing strategic weapons. The country has sufficient nuclear strength to deter the Soviet Union. The SDI is a long-range project that can proceed without a major funding increase next year. The country's greatest military need is in conventional forces.

The United States and the NATO allies are badly outnumbered by the Soviet bloc in terms of troops, tanks, aircraft and other conventional arms. Failure to beef up conventional defenses could compel the United States to resort to nuclear weapons in the early stages of a conflict with the Soviets. Furthermore, if training time and preparedness are reduced, American troops could be less able to overcome an adversary.

The foundation of the U.S. military, even in the nuclear age, is the individual soldier or sailor. The troops in the field shouldn't be shortchanged.

Soviet space lead should spur SDI

ST. LOUIS GLOBE-DEMOCRAT

19 June 1986

Critics of the U.S. Strategic Defense Initiative will find little comfort in the Jane's 1986 Spaceflight Directory, put out by the British firm that produces a variety of authoritative and up-to-date publications on air and spacecraft, modern weapons systems and the like.

Despite some spectacular NASA successes in interplanetary space travel, the directory contains a clear warning that the Soviet Union has an "almost frightening" 10-year lead overall in the practical utilization of space. According to Jane's, the Soviet cosmonauts have clocked up more than 4,000 days in space, compared with the astronauts' 1,587 days.

More than that, however, British scientist Reginald Turnhill, editor of the directory, observed in a statement that accompanied issuance of the 600-page volume that the SDI concept — a space-based anti-missile defense colloquially identified as "Star Wars" — could be turned to positive uses in more ways than one. While the Soviets have been long at work to develop such a system themselves, a successful U.S. SDI program could point the way to cooperation between the superpowers to prevent a "growing likelihood of irresponsible random nuclear attack from temporarily hostile smaller nations," Turnhill said.

Despite critics who condemn the SDI as a program that would only add to the arms race, Turnhill envisions it as entirely possible the super space powers could eventually conclude a joint space defense system would threaten neither, but could well be used to deter terrorist acts from maverick nations like Libya, should they ever gain access to rudimentary nuclear weapons.

Turnhill also offered a unique analysis of The Challenger disaster, saying it may have been caused as much by excessive caution as by excessive haste in getting the spacecraft aloft. The shuttle lay on its Florida launchpad for several weeks, "deteriorating in the worst of the winter weather," according to Turnhill, before the fatally flawed decision to launch was made.

COLORADO SPRINGS GAZETTE-TELEGRAM 27 June 1986

editorial

U.S. needs SDI for security

According to sources in the White House, President Reagan has wisely decided to reject a Soviet offer to ban missile defenses for another 15 years..Rather than bury the hope for a workable shield against ICBMs through the Strategic Defense Initiative, Reagan should intensify the battle for more research funds.

The Soviet Union's president-for-life, Mikhail Gorbachev, had sent Reagan a letter last month proposing sizeable cuts in nuclear arsenals along with a 15-year extension of the 1972 ABM Treaty, which restricts the deployment of anti-missile systems.

Reagan has reportedly taken a month to reply because of conflicting advice from his advisers. Some of the president's advisers, in particular those in the State Department, want him to agree to limits on SDI to gain deep cuts in offensive nuclear arsenals. Others, most notably Secretary of Defense Caspar Weinberger, have urged Reagan to accept no limits on SDI, even if that means forsaking an arms treaty with the Soviets. Meanwhile, Congress has cut the president's request for SDI research to $3.8 billion for fiscal 1987, a $2.4 billion cut from the president's original request.

The only advice the president should heed is this: Pursue SDI with all the urgency the nation can muster, because our security depends on it.

The Soviet Union desperately wants to stop an American missile defense, not from any concern for "world peace," but because SDI could neutralize the Soviets' chief claim to international prestige and power: their bulging arsenal of ICBMs. Without nuclear weapons, the Soviet Union would be a second-rate power. The only goods it can produce that other countries want are oil, arms and caviar. Any claims the Soviet Union might have to moral influence in the world have been ridiculed by its bald aggression abroad and its repression at home. What makes the U.S.S.R. a "superpower" is nothing more than its ability to annihilate its foes with nuclear weapons.

If the Soviet Union objected to SDI on the grounds of world peace, its rulers would not be pursing their own missile defense with abandon. The Soviets are spending an estimated $10 billion a year researching and developing defenses against nuclear missiles. They employ 10,000 scientists to research high-technology laser and particle-beam weapons. They are developing new generations of surface-to-air missiles designed to shoot down American missiles and bombers. They are deploying "phased-array" radars which would identify incoming warheads and direct SAMs to meet them. They have deployed the world's only operational AMB system, which protects Moscow from a nuclear strike.

If America were to abandon its embryonic attempt to defend itself from missile attack, it could by the turn of the century face nuclear blackmail. By then the Soviet Union could possess a nuclear strike force capable of gutting the heart of America's nuclear deterrent (some argue they are dangerously close to this capability now). What U.S. retaliatory forces survive a first strike would be intercepted and destroyed by the Soviet missile defense. Such a combination of first-strike weapons and missile defense would allow the Soviets to threaten nuclear devastation on America with no fear of a counterstrike. And history shows that the Soviet Union, when confronting a defenseless victim — Afghanistan, the Baltic republics, Eastern Europe, Korean Airliner 007, its own disarmed people — has moved ruthlessly to crush and incorporate the victims into its system.

The alternative is a secure America defended by an anti-missile shield. If America moves ahead with its own missile defense, as the Soviets are doing with theirs, the nations would be engaged in a race for security rather than destructive power. Moving ahead on SDI would convince the Soviet rulers that we will not accept the possibility of nuclear blackmail, nor will we trust our security to a paper agreement that could be fed into the same paper shredder as past agreements with the Soviet Union.

SDI, like America's freedom and security, should not be placed on the bargaining table.

DES MOINES REGISTER 1 July 1986

A defense of Star Wars ✱

Thirty former Soviet scientists now working or teaching in America have sent an open letter to Congress (reprinted on the opposite page) in which they urge that the U.S. government not let itself be wheedled out of Star Wars by Soviet promises.

The first thing to bear in mind is that they are *former* Soviet scientists. Although they profess a deep and no doubt genuine love for their motherland, they have no affection for its government or its system. Many or most of them left Russia for one reason: They are dissidents.

That's no cause in itself to disbelieve them, of course. Much of what they write about Soviet programs, goals and beliefs is only too true. But the fact that they are dissenters, political emigres, cannot help but color their perceptions. Their undoubted experience and knowledge must be qualified by the likelihood that they are more prone than a disinterested person to see evil where there is no evil and to magnify the evil that there certainly is.

They say that the leadership in the Kremlin believes a space defense against missiles to be technologically feasible and is working on one. The great majority of American scientists and military space experts seem to believe otherwise, but the question is less whether Star Wars is doable than whether it ought to be done.

They say yes, do it to foil Soviet world domination. But so-called space defense probably is not even one of the better ways to accomplish that.

We are skeptical of most of what the 30 scientists say, and we disagree with much of it. But their side of the argument — which also is President Reagan's side — deserves a fair hearing.

We need the Space Shield

WASHINGTON TIMES

11 July 1986

President Reagan's greatest political success is the Strategic Defense Initiative, which would protect Americans long after he left office. And since the acronym SDI still hasn't caught on, it might justly be rechristened the Reagan Space Shield.

Yet appeasement enthusiasts, including some in the Reagan administration, are trying to trade it for "arms control." It would be a bad bargain. Consider the terms now being weighed. America and the Soviets would agree to cut land-based missiles by anywhere from 35 to 50 percent. In return, the Soviets propose that we postpone SDI deployment for 15 to 20 years. This isn't arms "control." It's closer to surrender.

The Soviets are gradually converting their entire land-based arsenal to mobile missiles such as the SS-25, currently being deployed, and the SS-X-24, which is near production. Using what they call *maskirovka* techniques, they wheel these nukes under concrete bunkers or into caves, masking them from American spy satellites. A 50 percent "reduction" would entail halving our arsenal while the Soviets placed half of theirs safely out of sight.

Moreover, no treaty would keep the Soviets from pursuing their own Star Wars research and deployment. In an open letter to Americans, 30 emigre Soviet scientists recently wrote: "The Soviet scientific community and government leaders believe that effective strategic defenses are technically possible and doable . . . The Soviet Communist leaders can be expected to continue working on their 'Star Wars' system, either overtly or covertly and with high priority, no matter what they say or what they sign, or what the U.S. does."

Clearly, America must develop and deploy the Reagan Space Shield as soon as possible. Delaying deployment for a decade would effectively kill it. As Defense Secretary Caspar Weinberger observes, the "Soviets know you can't get funding for a program if you've said you're not going to use it for 10 years."

The president should hang tough. America needs the Strategic Space Shield and needs it now.

Budget Limits on 'Star Wars'

BALTIMORE SUN

7 July 1986

Year after year, Defense Secretary Caspar W. Weinberger has marched up to Capitol Hill to warn that a single penny cut from the military budget would be tantamount to capitulation to the Russians. And year after year, with increasing effrontery, Congress has dared to cut pennies, dollars, millions, billions (real money, in other words) only to find that Mr. Weinberger's Pentagon can live with these reductions.

This pattern, combined with staggering deficit pressures and evidence of mismanagement in the defense buildup, has now produced a congressional uprising. Mr. Weinberger's days of budget boosts far above the inflation rate are over. Last year he had to struggle just to keep pace and this year he won't make it. In addition, once-friendly armed services committees are forcing overhauls of procurement procedures, insisting on reform of the joint chiefs of staff structure and challenging virtually every major weapons system.

Including "star wars," President Reagan's vaunted Strategic Defense Initiative. As described by the administration, SDI is intended to build an impregnable shield protecting the whole country against enemy missiles, which would thereby be rendered obsolete. But the Senate Armed Services Committee now questions this basic concept. It has called for a switch in "major emphasis" from population defense to the more modest goal of defending U.S. missile-launching sites. Mr. Weinberger's response was that the committee is "myopic" even as he lauded an experiment in weaponry that would be needed in last-ditch defense of military targets.

Charles W. Corddry, military correspondent of *The Sun*, reports that the committee action is "the first legislative attempt to make major changes in the aims of the star wars program." It packs punch because it comes from a panel that is not automatically against any kind of strategic defense but reflects a skepticism (even high in the Pentagon) about SDI's vast ambitions.

While concepts are important, money talks. And at this stage, SDI and other key parts of the Pentagon budget are taking a drubbing on Capitol Hill. The budget resolution adopted just before the Fourth of July recess called for a defense authorization of $292.2 billion in fiscal 1987, a whopping $28 billion slash that could force Pentagon spending below the inflation rate.

Funding for SDI is likely to be cut from a requested $4.8 billion to around $3.5 billion, a slice that may even make the administration more amenable to a deal with the Russians. In exchange for restrictions on missile defense, the Kremlin has hinted a readiness to accept deep reductions in offensive weapons. Thus the defense budget battle on Capitol Hill has a significance that goes well beyond the now-firm tradition of squabbling with Mr. Weinberger.

Defending Lady Liberty

WASHINGTON TIMES

7 July 1986

Last month an Army missile intercepted and exploded a target rocketing faster than 2,000 mph, for the time testing Strategic Defense Initiative technology against a moving target. Let the naysayers think again. SDI works.

Yet much research remains to be done — research that Senate and House budget proposals, if passed, would retard. Before leaving town for its Fourth of July recess, the Senate Armed Services Committee cut almost $1 billion out of President Reagan's $4.8 billion SDI research request for fiscal year 1987. Proposed House budgets would whack even more. As our congressmen return from celebrating Lady Liberty, they ought to give some thought to the 240 million or so "huddled masses" whose hopes she represents.

The congressional cuts leave just enough money to continue research on an SDI system to defend only the U.S. missile force, leaving cities unprotected. The tactics are obvious. Some congressmen hope to shut down SDI research completely.

If SDI defends only American missiles, why not just build more missiles in harder silos? And while Americans might rally around a missile system that protected their families and homes, they might flinch at spending billions to protect missiles alone.

The mind's ear hears the anti-SDI rallying cry: "People, not Missiles!" And let's be fair. They would have a point. Even the Soviets are constructing a Star Wars system — in violation of the 1972 ABM treaty — that eventually will protect most of the Soviet populace.

Yet protecting complex ICBMs with even more complex SDI missiles has little sex appeal. Important as such a system is, the abstract arguments in favor of it approach the incomprehensible. For political reasons, any SDI program must protect missiles *and* people.

That means conducting research at the $4.8 billion level proposed by President Reagan. When our congressmen return, they should appropriate the money for an SDI program adequate to sustain the nation whose birth they were celebrating last week.

ST. LOUIS GLOBE DEMOCRAT

8 July 1986

Soviets lead in nuclear defense

As Congress prepares to cut somewhere around 25 percent of the Reagan Administration's proposed funding for SDI, the solons might pause for just a moment to reflect upon the real world that their votes will so decisively influence. So doing, they might perhaps notice that the United States is not the first nation to investigate the possibility of a defense against nuclear weapons; the Soviets have been not only investigating the matter, they have been doing something substantial about it.

Despite the two nations signing an anti-ballistic missile treaty prohibiting such defense systems in 1972, the Soviets have been proceeding apace with the "Red Shield," a ballistic-missile-defense-system covering the entire Soviet Union. While SDI remains largely theory, the Red Shield is rapidly becoming operational. Its main elements include:

* Completion by next year of a modernized 100-launcher ABM system around Moscow.
* Production of a new generation of ABM interceptor rockets and associated radars.
* Continued upgrading of and new construction on a nationwide network of long-range detection and battle-management radars of unparalleled size and power.
* Intensive work on "beam weapons" and other advanced technology, including testing of laser weapons.

The Soviets are pouring around $10 billion a year into Red Shield. Already the Soviet Union has about 12,000 surface-to-air missile launchers, many with ABM capability. These SAMs tie into a network of 10,000 air-defense radars. The United States, by comparison, has no SAMs with ABM capability and only 118 air defense radars.

It was foolish really to think that the ABM treaty of '72 would have any real effect on Soviet behavior. The Soviets, quite apart from their ideology of world conquest, are governed by a long-standing, deeply-felt commitment to defend the Motherland, regardless of the cost, standing treaties or the exigencies of diplomacy. That they would fail to observe the treaty was utterly predictable.

Unfortunately, the United States is not so single-minded in its pursuit of national security. This nation has honored the ABM treaty in the face of countless, obvious Soviet violations. SDI is the first challenge of any sort to complete Soviet hegemony in the area of nuclear defense.

Difficult though it may be for the masters of the 24-second TV byte, Congress needs to think strategically when it considers programs such as SDI. Actually, though, there are no other programs that can be compared to SDI. Potentially, it offers a uniquely high payoff for the dollars spent. Moreover, it may prove to be the sine qua non for national security. Once the Soviets have in place a complete nuclear defense system coupled with their steadily increasing offensive arsenal, if the United States does not have similar capabilities a first strike will begin to look awfully tempting to Soviet planners.

The SDI program and the need it addresses are matters of the utmost seriousness. Let's hope Congress is suitably sober about the requirements of national security as it deliberates the fate of this program. SDI should be funded in full if the United States hopes to keep pace with Soviet efforts at nuclear defense.

LOS ANGELES TIMES 15 July 1986

Hobby Shop Takes Off

President Reagan's call for defenses against nuclear missiles is taking strange turns that he surely could not have seen three years ago. He is going to have to move quickly to keep it from getting completely out of hand.

He could not have intended that the Pentagon would be adding another act to what became a "Star Wars" circus last month when it passed off what is actually an anti-aircraft weapon as a milestone toward Reagan's dream of a shield against nuclear weapons.

A weapon that was tested in the New Mexico desert in late June might someday serve as a fairly good defense against supersonic aircraft if the country could afford enough of them. But hailing it as progress for Star Wars was like promoting a one-story flight of stairs as an important step toward the moon.

Its timing had more to do with the fact that Congress is balking at handing over $5.4 billion more to the Pentagon for Star Wars than with the kind of basic research that is needed just to discover whether the dream is within reach of 20th-Century science.

Over the weekend Reagan once again held out the promise of "a defensive system that can protect us and our allies against all ballistic missiles, nuclear and conventional."

But the truth is that the billions of dollars spent on Star Wars since Reagan's 1983 call for defenses to make nuclear weapons "impotent and obsolete" have served chiefly to turn up new obstacles to making such a system work. Recent failures of far simpler space systems, including the disasters of the shuttle Challenger and two workhorse launchers used to launch satellites into orbit, only underscore the difficulty.

Yet Times staff writer James Gerstenzang reports from Washington that the program, even with the cuts in Star Wars funding that Congress has in mind, may already have reached a critical mass of defense contractors and star warriors that would blow up in the face of Congress if the latter chopped spending to reasonable levels.

The program already has a constituency of contractors, research laboratories and communities that are accustomed to a flow of $3 billion a year and looking for more. It may have developed the kind of momentum that Congress will have difficulty turning off.

Several hundred physicists have pledged not to work on the system, but as one official working for a defense contractor told The Times, others are attracted to the program: "When you start talking about ray guns and mirrors in space, you're talking about a wonderful hobby shop."

A hobby shop for engineers who might otherwise devote their talents to helping the United States stay ahead in the race with other industrial nations toward higher peacetime technology cannot be what Reagan originally had in mind.

Nor can he be faulted for not understanding that what he seemed to promise three years ago probably is impossible. Nor was it clear at the time that even trying to see whether such a system could be made to work might mean wiping out existing arms-control agreements such as the ABM treaty limiting what both the United States and the Soviet Union could do with defenses.

Reagan still can throttle back the hobby shop to reasonable levels of spending, somewhere between $2 billion and $3 billion a year, that would build a base of real research that might some generations into the future diminish the nuclear threat.

That would come naturally if he modified his position that Star Wars is off-limits for arms-control agreements. An agreement with the Soviets on major cuts in offensive weapons that still allows prudent Star Wars research is still in the cards. He must move in that direction before Star Wars takes on a life of its own and turns his dream into a nightmare.

OMAHA WORLD HERALD
25 July 1986

Space Defense Should Go On

Opponents of the Strategic Defense Initiative are being shortsighted when they use the estimated cost of the missile defense program as a reason for scrapping the project.

True, some of the estimates are astronomical. The Foreign Policy Institute of Johns Hopkins University the other day put the figure at $1 trillion, which is a year's worth of spending for the federal government.

But, as Defense Department officials pointed out, nobody knows what the system would cost. Nobody even knows whether it would be feasible. Space-based defenses are still largely at the research stage. The technology is not yet available to do everything President Reagan has said the system should do. Breakthroughs yet to be made could change everything.

Why not try, however? The Soviet Union is trying, despite its efforts to persuade the United States to abandon the idea at the conference table. The fact that a space-based missile defense might be expensive would be the wrong reason for the United States to quit investigating the possibilities.

FINANCIAL TIMES
15 July 1986

UK role in Star Wars

AS A prelude to addressing a conference on international participation in the US Strategic Defence Initiative in Brussels today Lt Gen James Abrahamson, the director of the programme, has been talking with the UK Defence Ministry on progress in bringing British technology-based companies into the project. Under an agreement signed between the US and UK Governments last December, UK concerns have the chance to bid for potentially lucrative contracts under the programme, popularly called Star Wars, which is due to spend up to $30bn by the early 1990s in devising a space-based shield to defend the West from nuclear attack.

Progress on UK collaboration since December has been far from promising. So far, British companies and government establishments have received Star Wars contracts worth about $15m, a far cry from the $1.5bn that Mr Michael Heseltine, the former UK Defence Secretary, was talking about last summer and also from the "hundreds of millions of dollars" which Gen Abrahamson himself mentioned during a visit to Britain in February.

The UK contracts are mostly for theoretical studies in technologies such as computing and sensors where British scientists have particular expertise. These studies, which cost relatively little and employ few people, could conceivably lead to awards to UK concerns for the procurement of hardware such as computer systems in the later stages of the research programme. For this type of work, the cash sums would be much larger.

Technical thrusts

The possibilities of this sequence of events taking place in any significant way, and so leading to large-scale contracts for Britain, are looking more and more remote. The budget for Star Wars is coming under increased pressure in the US Congress. The Reagan Administration appears unlikely to obtain more than about $3.9bn for the anti-missile project for the year beginning in October, compared with the $5.4bn which is has requested.

Furthermore, the longer the Star Wars project goes on without UK concerns gaining a foothold, the harder it will be for them to build up enough momentum to obtain substantial contracts in later years. Many of the important decisions about the direction of the programme have already been taken. Teams from US aerospace and defence companies have been working on the main technical thrusts for a couple of years. They are bound to be in a better position to win the significant contracts than UK groups which are becoming acquainted with the nuances of the programme relatively late.

Were it not for the high expectations of UK involvement in Star Wars which both Whitehall and the US Defence Department have encouraged, the current state of affairs would not be surprising. British concerns were always going to find it difficult to break into a programme whose centre is 8,000 miles away in Los Angeles, the focal point of the US defence systems industry.

Procurement policy

More realistically, however, the UK Government may have only itself to blame. Ministers should take a hard look at the motives which caused them to sign last December's agreement in the first place. On the face of it, the US won implicit political support for its controversial programme by getting a major ally to agree on participation in the research. The UK, as events have turned out, gained relatively little in return.

It is questionable whether British concerns would be in a worse position to win future contracts if the intergovernmental understanding had never been signed. This is especially true as the lion's share of any future deals are likely to place UK concerns as junior partners in subcontracting deals with US industry, arrangements in which only minimal government involvement appears necessary.

The talks over Star Wars collaboration have, for the most part, underestimated the problems and oversold the potential benefits. The endless meetings over the project between US and British officials have led to few useful results other than to give Whitehall an insight into the complexities of US military procurement policy and to hand airlines operating transatlantic routes a bonus in ticket sales. It might have been better, when it came for discussions over UK-US Star Wars collaboration, if the British Government had stayed on the sidelines.

Keep the SDI Research Going

Now that the Soviet Union is hinting that it may be ready to get serious about arms control, the last thing the United States needs is to weaken its negotiating position. In other words, this would be a poor time for Congress to cut funds for research on the space-based defense system.

Soviet concern about the technological capabilities of the United States almost certainly is one of the reasons the Soviets want to resume negotiations. Talk in the United States about whether the space-based research should be a "bargaining chip" for the next round of talks is premature.

Critics of the space defense system have said that the idea is unaffordable and impractical and that it would destabilize the U.S.-Soviet relationship rather than reduce tensions. Some of the concept's supporters, including the Reagan administration, concede that it would be ambitious, complex and expensive, but they hold out the possibility that it could increase the nation's security and reduce the chances of a nuclear war.

Continued research would answer some of the questions. Moreover, a demonstration of America's determination to defend itself has proved to be the most realistic way to bring about meaningful negotiations.

If the United States scaled back the space-based defense program, either for domestic budgetary or political reasons or out of a desire to appear reasonable to the Soviets, Moscow would have an unearned and unreasonable edge. Having already received some of what it wanted, the Kremlin would then be in a position to demand something more.

OMAHA WORLD HERALD

15 July 1986

SDI at Kitty Hawk

WASHINGTON TIMES

25 July 1986

Ronald Reagan keeps insisting that his Strategic Defense Initiative must include research *and* testing. Arms control advocates reply that since SDI could get along for up to 10 years on lab research alone, we should accept the Soviet proposal to swap SDI tests for large ICBM cuts. This implies that Mr. Reagan, ignorant about nuclear weapons, should trust the experts.

Well, he may be no Enrico Fermi, but he shows a keener insight into the nature of technical development than do many arms control gurus. Perhaps he retains the spirit of his youth, when every American boy idolized Wilbur and Orville Wright.

According to historical accounts, the Wright brothers methodically studied contemporary aviation techniques, then went to work on their own theories, conducting thousands of experiments on each part of their prototype airplane. For three years they tested their theories on gliders at Kitty Hawk. Finally, in 1903, the world's first airplane flew.

Research without testing is useless. Limiting SDI to research would kill the program, for which reason Mr. Reagan wisely refuses to ban testing. Unfortunately, his latest proposal makes a corollary mistake: it would let both sides test space defense systems, but would extend to five years the 1972 ABM treaty's six-month cancellation clause. That would mean that, once we perfected SDI, we couldn't deploy it for half a decade.

Such a delay would give the Soviets time to perfect countermeasures that could make SDI obsolete before it was even deployed, wasting money already spent. How much would that be? A recent study commissioned by the Foreign Policy Institute, a liberal think tank and no blind SDI supporter, puts SDI costs at $770 billion over 10 years. That comes to $77 billion a year, about a quarter of current defense expenditures. Few Americans would consider that too much to pay for not being blown up.

And what if the Soviets used their current 15-year ABM research lead to make the first breakthroughs? Does anyone doubt that the Kremlin would sneak their Star Wars into production without notification?

Once the Wright brothers perfected their invention, they sold it to the U.S. Army. From that day until the insane Mutual Assured Destruction doctrine was instituted in the mid-1960s, the American military ruled the skies over America. We should trust the wisdom of Kitty Hawk, not the Kremlin's promises, and go ahead with SDI. The Wright brothers were right.

SAN DIEGO UNION 3 August 1986

SDI imperiled

President Reagan vowed again last Tuesday not to bargain away his plan for building a strategic defense against Soviet nuclear missiles. However reassuring that sounded, it hardly squared with the negotiating position set forth by Mr. Reagan just the week before in a letter to Soviet leader Mikhail Gorbachev.

In the letter, Mr. Reagan sketched the rough outline of a deal: Deep cuts in the superpowers' nuclear arsenals in exchange for Washington's agreement to eschew strategic defense and extend the 1972 Anti-Ballistic Missile (ABM) treaty for another five to seven years. To be sure, the negotiating stance outlined in the Reagan-to-Gorbachev letter reserved the U.S. right to continue research into strategic defense. Indeed, the letter asserted the right of either superpower to deploy a space-based missile defense after the ABM extension expired.

But there was less to these caveats than met the eye. And there was lamentably more to the concessions on extending the ABM Treaty, which bans effective defense, and postponing any deployment of SDI until at least the 1990s. The Soviets know that no ban on laboratory research into SDI could be verified in any case, so they are prepared to accept an American research program, even as they continue their own intensive research into anti-missile defense technology.

The Soviet goal is to block any actual deployment of an American anti-missile defense. The necessary interim step toward that objective is delay: Delay while Congress whittles down funding for SDI; delay while the Soviets build a global propaganda campaign against SDI; and delay while public support erodes for spending billions of dollars on research into a defense program that, in any event, appears to be no more than a bargaining chip likely to be surrendered in the end. Congress is already cutting the administration's proposed SDI research this year by nearly 30 percent.

Thus, extension of the ABM Treaty — and never mind, apparently, that the Soviets are flagrantly violating it — and forgoing strategic defenses until well into the 1990s must seem almost all that Mr. Gorbachev could have hoped for. The Soviet arsenal of super-heavy, land-based missiles armed with multiple warheads and suitable for a disarming first strike against the United States is so large that Moscow could easily scrap, say, a third of its warheads without yielding the nuclear advantage it now possesses.

Ironically, it was less the Soviets than some of Mr. Reagan's own advisers, especially Secretary of State George Shultz, who maneuvered the President into jeopardizing SDI's future. Mr. Shultz and the arms-control lobby at State want an arms agreement with the Soviets enough to put SDI on the table to get it. Better by far for Mr. Reagan to have listened to former Secretary of State Henry Kissinger, who offered wise advice recently that the President should have heeded.

In a speech last March, Mr. Kissinger declared that President Reagan should end the diplomatic impasse over "Star Wars," and enhance America's security in the process, by pledging unequivocally to deploy a missile-defense system. Only the extent of the defenses would remain as negotiable, and that could be made strictly subject to the levels of Soviet offensive forces.

By rejecting the Kissinger approach in favor of the Shultz version, Mr. Reagan mortgaged the future of SDI and, however unwittingly, imperiled the most important American defense program in a generation.

NEW YORK CITY TRIBUNE 5 August 1986

Giving the Soviets What They Want

President Reagan has vowed not to bargain away his plan for building a strategic defense against Soviet nuclear missiles. However reassuring that sounded, it hardly squared with the position he set forth July 25 in a letter to Soviet leader Mikhail Gorbachev.

In the letter, Reagan reportedly proposed deep cuts in the Soviet nuclear arsenal in exchange for Washington's agreement to eschew deployment of the Strategic Defense Initiative for 7½ years. It also reportedly offers to discuss with the Soviets in 1991 how both countries might make the transition from the present retaliation-oriented strategy of "mutually assured destruction" to a defense-oriented strategy.

To be sure, the proposal reserved the U.S. right to continue research into strategic defense. And administration officials say that since the SDI program schedule doesn't envision a decision on whether to deploy a missile defense until the early 1990s anyway, it doesn't give up anything of substance to the Soviets.

The point is, however, that the Soviets have *already* deployed their own version of "star wars" in the form of anti-ballistic missiles controlled by huge raders connected by computer and are continuing their own intensive research into anti-missile defense technology, including space-based laser and particle-beam weapons. They have reportedly developed a rocket-driven space-based generator that can power an orbiting laser gun and the U.S. has nothing like it.

Delaying deployment of SDI, therefore, fits right into the Soviets' plans, the main goal of which is to block any actual deployment of an American anti-missile defense. A key interim step toward that objective is delay: Delay while Congress whittles down funding for SDI; delay while the Soviets build a global propaganda campaign against SDI; and delay while public support erodes for spending billions of dollars on research into a defense program that, in any event, appears to be no more than a bargaining chip likely to be surrendered in the end. Congress is already cutting the administration's proposed SDI research this year by nearly 30 percent.

Thus, foregoing strategic defenses until well into the 1990s must seem almost all that Gorbachev could have hoped for. The Soviet arsenal of super-heavy, land-based missiles armed with multiple warheads and suitable for a disarming first strike against the United States is so large that Moscow could easily scrap, say, a third of its warheads without yielding the nuclear advantage it now possesses.

Ironically, it was less the Soviets than some of Reagan's own advisers, especially Secretary of State George Shultz, who maneuvered the president into jeopardizing SDI's future. Shultz and the arms-control lobby at State want an arms agreement with the Soviets enough to put SDI on the table to get it.

Better by far for Reagan to have listened to former Secretary of State Henry Kissinger, who offered wise advice recently that the president should have heeded. In a speech last March, Kissinger declared that President Reagan should end the diplomatic impasse over "Star Wars," and enhance America's security in the process, by pledging unequivocally to deploy a missile-defense system. Only the extent of the defenses would remain as negotiable, and that could be made strictly subject to the levels of Soviet offensive forces.

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Reagan should also heed Conservative leaders in both houses of Congress who are mounting a major offensive to reverse his decision. The leaders have requested an urgent meeting with the president this week. Rep. Jack Kem, R-NY, said in a statement recently that the president's reported move would "lock us into a position of strategic inferiority. I know of no surer way of losing congressional support for a program than to lead people to believe that their money is being spent on a program we may give away."

PROVIDENCE JOURNAL 6 August 1986

Is sharing SDI technology a sound idea?

When President Reagan sent his latest letter on arms control to the Kremlin, he added a surprise. Whatever Mikhail Gorbachev's reaction, the reaction from those who generally favor more cooperation with the Soviets was a long groan. The reaction speaks volumes about the political debate over SDI and the administration's strategic policy in general.

The surprise was a suggestion that if the United States and the Soviet Union both erect strategic defense systems, perhaps they could be operated jointly. Now, you'd think that the first to applaud would be those who complain incessantly about how badly the President treats the Russians. But no dice. Instead, they groaned louder than anyone else.

As with its sister idea, broached two years ago, of sharing SDI technology, the idea gives Reagan critics that rare chance to show they really are not "soft" on the Soviets. They can raise their eyebrows at the supposed folly of providing the Soviets data and expertise on defensive matters while the U.S. refuses to sell them computers of far less complexity. How, they ask with mock concern, could the President even *consider* trusting the Kremlin with such extremely sensitive defense secrets!

In fact, both sharing the technology and jointly operating the eventual defensive systems that result make sense if considered within the framework of Mr. Reagan's clearly enunciated strategy toward the Soviets.

Strategic defense is just one of a set of tactics obviously designed to check Soviet ambitions in the world. Another is the tactic of supporting a range of rebel movements against the Soviets and their client regimes. Another is that of helping democratic movements oppose right-wing tyrannies so as to preempt any Soviet-backed opposition movement. Others pit free-market capitalism against the centralized economy of Soviet communism, so as to lure Third World governments away from the more rigid forms of socialism.

The goal is not to defeat the Soviets militarily but to defeat them politically and philosophically. After 10, 15 or 20 years, the Reagan administration no doubt figures, the Soviets will get tired of this and will give up their imperialism in favor of peaceful coexistence. Perhaps then the idea of virtually eliminating nuclear weapons along with a sharing of strategic defenses — obviously unacceptable today — won't seem so utopian.

Mr. Reagan's geopolitical strategy is a concept of global and historical importance. This nation attempted mutual coexistence with the Soviet Union based on treaties in the last decade. But, because the Soviets saw that the West was irresolute in defending its interests and unwilling to insist on Soviet compliance with a range of treaties, that approach didn't work. Maybe Mr. Reagan's approach won't work either, but why not try? Ideas such as the joint operation of SDI should, like the rest of the Reagan agenda, be open to full discussion. But for those who have long urged closer ties with the Soviets to refuse to take these ideas seriously suggests that the charge of "cold-war mentality" needs redirection.

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