EIR Special Report

Anti-missile results show that 'Star Wars' opponents are lying

by Paul Gallagher

U.S. "beam weapons" experts have submitted reports summarizing their progress through mid-1984 on President Reagan's Strategic Defense Initiative (SDI)—the plan to defend against nuclear attack with anti-missile systems based on land, sea, in the air, and in space.

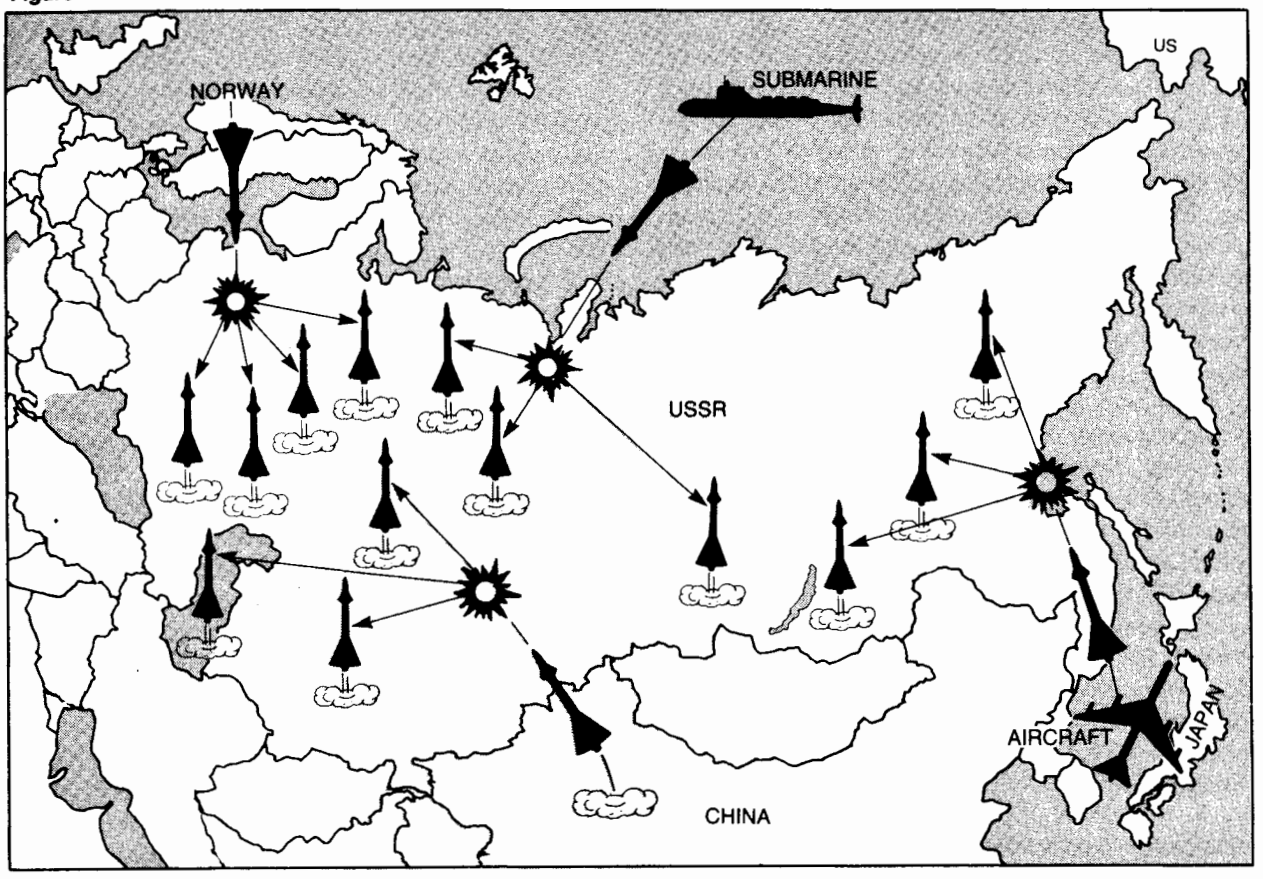
The breakthroughs these scientists are reporting demonstrate dramatically the near-term potential for the whole range of ABM defense capabilities, from earth-basing to low-earth orbit and "pop-up" deployment, and all the way out beyond geosynchronous orbit, 22,000 miles up. Dr. Lowell Wood of Lawrence Livermore Lab emphasized recently, "My colleagues and I would not be expending this effort on a development for the 21st century."

The national lab reports which we publish below were written to debunk incompetent critiques of beam defense which dominate public discussion through the press—critiques of the general "authoritative" character of Adm. Leahy's famous 1944 remark, "the atomic bomb will never go off, and I speak as an expert in explosives."

One technology review paper on anti-missile defenses was prepared at Los Alamos National Laboratory. It shows that the most publicized anti-ABM policy papers—in particular, the one being circulated by the U.S. Office of Technology Assessment (OTA) with the authority of the U.S. Congress—are outright scientific frauds, perpetrated deliberately by individuals with a political goal: to stop the Strategic Defense Initiative.

These fraudulent reports have been produced by what the *New York Times* has called the "Shadow Cabinet" of defense strategists, centered around a group of Harvard and MIT physicists and arms-control "experts." The most famous anti-beam-weapon report, written by former defense adviser Ashton Carter of MIT and published by the Tip O'Neill-controlled Congressional OTA, has been rendered into anti-"Star Wars" pulp by virtually every Sunday magazine supplement in the United States and Europe. Other well-known attacks on anti-missile defense, from the so-called Union of Concerned Scientists, were written by the same circle, which includes Carter, Richard Garwin of IBM, and Hans Bethe of Cornell.

Figure 1



X-ray laser pop-up defense

Shown are some of the geographical locations and modes of deployment for a pop-up intercept of missiles by nuclear-bomb-powered x-ray lasers. Each x-ray laser module is capable of destroying upwards of 100 ICBMs. Upon detection of the ICBM launch, defensive x-ray lasers are "popped up" into space on hypersonic rockets from land bases in Western Europe and Asia, from submarines, and from aircraft.

The Los Alamos report shows our beam scientists surpassing every one of those "fundamental limits" which, according to Carter, would make beam defense impossible. The blatant incompetence of the Carter report led the Defense Department to demand that it be formally withdrawn from circulation. It is now clear that: 1) Carter's report both compromises classified information *and* fakes its claims that beam defenses won't work; and 2) OTA director John Gibbons is resisting pressure to withdraw the report, from the DoD and four labs and other agencies that reviewed it. According to a synopsis of these reviews issued by Deputy Secretary of Defense William H. Taft, the report should "not be taken seriously by anyone attempting to understand either the design approach to multi-tiered ballistic missile defense sysems or the potential effectiveness of such systems."

The Los Alamos group insists that the OTA report is not merely wrong but irrelevant to the actual progress of the SDI. "When the errors are removed, the arguments lose their impact. . . . The OTA paper purports to demonstrate that the prospects for the SDI are remote. But the analysis provides no support for this conclusion, which must be viewed as essentially the personal opinion of the principal author."

Stop the coverup

The scientists' reports are now circulating to members of Congress so quietly as to be virtually secret. Even advocates of the Strategic Defense Initiative have kept quiet; the Reagan White House and Republican congressional leaders, under pressure from Henry Kissinger's arms control mafia, have made no effort to publicize the national laboratory reports. Yet the reports reveal anti-missile beam-weapon technology, as well as ABM rocket-interceptor technology, leaping ahead toward the stage of engineering development. This has occurred despite the most rigid restraints against considering any development approach which might call into question Kissinger's 1972 ABM Treaty. President Reagan has ac-

cepted these restraints, despite the growing discontent of Secretary of Defense Caspar Weinberger.

As the documents which we publish below reveal, the Defense Department fought during the month of July to force the OTA to repudiate and withdraw its report. Had this occurred, it would have provided a public victory to Weinberger and Lt. Gen. James Abrahamson, Director of the Strategic Defense Initiative, and broken an opening for rapid expansion of the program. Both men receive regular reports that the Soviet Union has kicked over the ABM Treaty and is well on the road toward an "ABM Treaty breakout."

The much-ballyhooed OTA report is purely political in its method. Dr. Carter defines something called "perfect defense" as complete interception of an all-out Soviet nuclear attack *targeted against cities,* rather than military-strategic forces as well. No such war-losing strategy is contemplated by the Soviet command. He then arrays technically incompetent or obsolete demonstrations that such "perfect defense" is a remote possibility.

The OTA method is akin to claiming that further breakthroughs in medical technology are unlikely, because an average human life span of 150 years is still a remote possibility. Shown that medical-technology breakthroughs *are* occurring, such a "critic" replies, "But I confined my remarks solely to showing how remote was the possibility of a 150-year average lifespan."

The research breakthroughs

In counterattacking against these frauds, the lab scientists reveal some spectacular breakthroughs in beam technologies for the first time.

- Perhaps most unexpected are revolutionary developments in "x-ray optics." Material cavities and other means are being developed to reflect x-rays, whose extremely high frequencies are not reflected by any previously conceived mirror. This points to a true x-ray laser far more efficient than a simple high-power x-ray beam, remaining precisely and brightly focussed for vast distances. Such a super-lethal anti-missile weapon may kill a dozen or more boosters at once from 25,000 miles, or more than a hundred boosters in a single shot in a close range, "pop-up" deployment (**Figure 1**). According to the Los Alamos report, "It would be possible to forward base x-ray lasers from submarines stationed . . . in the Kara Sea or the Sea of Okhotsk [sub-Arctic waters—ed.]
position before burnout of Soviet ICBMs of current *and advanced* design. . . . Each laser could attack over 100 boosters. Since it would be possible to launch 10 or more missiles from a submarine in that timeline . . . the OTA's own analysis indicates that one submarine could negate the full simultaneous Soviet launch [emphasis added].

- X-ray lasers, in defiance of every "authoritative and fundamental" assertion of their limits in public discussion, will penetrate the earth's atmosphere from space, down to an altitude of about 50 miles, even with the current linear beam power levels being considered. They will thus be lethal against advanced "fast-burn boosters" not yet even developed, which burn out within the atmosphere. **Figure 1** gives a sense of what this will mean, with "pop-up" deployments of powerful anti-missile devices directly attacking the boosters at ranges of only a few hundred miles.

- Nearer to hand, U.S. scientists expect a prototype neutral particle beam (**Figure 2**) to be ready for space testing in this decade, with a beam that can be almost as "bright" and tightly focussed as a laser, far more destructive to electronics and subject to virtually no possible countermeasures. The Los Alamos reporting group states flatly that fundamental physical limits thought to make particle beams spread out rapidly over long distances, simply do not apply to new techniques of high-power beam generation. These particle beams will be deadly to the sophisticated, precision-guided "post-boost vehicles" which are lifted into space by the booster and then open up, maneuver, and release warheads onto various targeted trajectories.

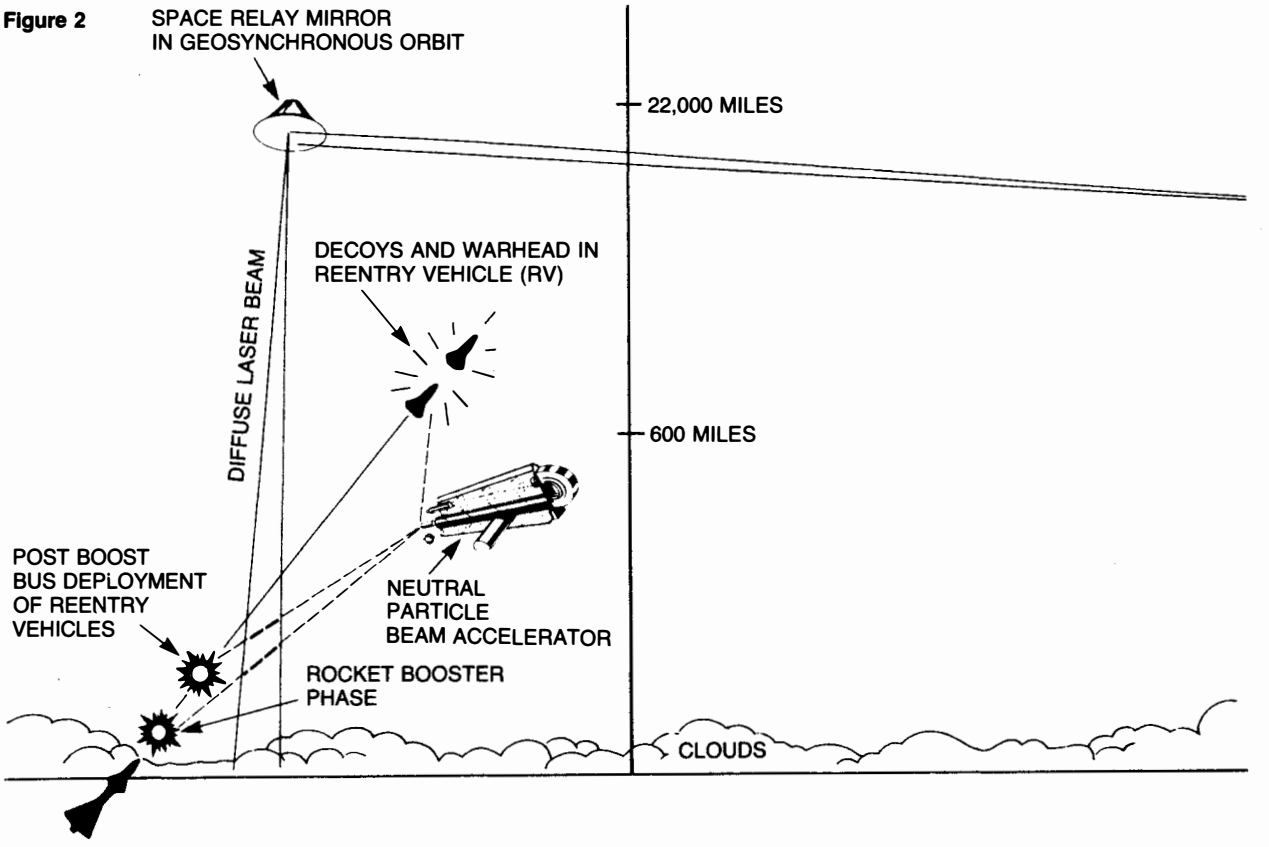
- "Active optics compensation of turbulence has in fact been demonstrated," to correct for distortion of high-power laser beams "burning their way" up and out of the atmosphere into space. This means pulsed, high-frequency lasers can be deployed on earth and have their beams relayed into space for thousands of kilometers to "fighting mirrors" which are engaging boosters at close range over Soviet launch corridors. Prototypes of these pulsed lasers, using krypton-fluoride fuel, have already reached 3 trillion watts of power and a larger prototype is now under construction.

- Relay mirrors for these high-power pulsed lasers based on the earth can even be placed in 22,000-mile geostationary orbit. Dr. Wood says that x-ray lasers can be stationed *beyond* geosynchronous orbit. These beam weapons and mirrors will be virtually invisible and invulnerable, while enjoying a "long clear path" to the target area which is always in their view.

- Orbiting beam weapons which are out of kill range of missiles, post-boost vehicles, and warheads will use their beams as tracking devices from the "fringes of the battle," providing number and variety of tracking beams directly linked to battle-management computers. These tracking beams, the scientists report, will be able to illuminate their targets to produce a return signal bright enough for "signal processing"—that is, the sensors will be able to "see" and track objects which are much smaller than the diffraction limit of the beam itself.

- "Free-electron laser" technology is becoming "mature" for both ground basing and possible space basing. These lasers are super-efficient in converting input energy into beam power; and they can be "tuned" to emit beams at different electromagnetic frequencies to maximize their lethality against boosters, post-boost vehicles, or warheads. Santa Barbara researchers have just announced the first free electron laser which is "tunable" in the "far infrared" region of the spectrum.

Figure 2



Neutral Particle Beam

The neutral beam would be able to engage missiles in the boost, post boost (bus), and mid-course phases of their trajectories. Shown above is a neutral particle beam accelerator in a near earth orbit at an altitude of 600 miles, engaging missiles in all three phases. In this case a diffuse laser beam directed from a relay mirror in geosynchronous orbit is used to light up the neutral beam so that it can be easily directed onto the missiles in the same manner in which tracers are utilized by anti-aircraft guns. According to the Los Alamos report: "neutral particle beams would have the very high effectiveness against post-boost vehicles, which are heavily dependent on electronics and can stand little interruption in their function, and reentry vehicles, which are exposed for a very long time and very susceptible to neutral particle beam effects in mid-course." Also, neutral beams kill at very low energy depositions: "10 Joules/gram (1 Megarad) corresponds to *destruction*—not 'transient upset'—of electronics. This is a hard kill mechanism." As for attacking the post-boost bus, Los Alamos notes: "Adequate active techniques exist to make tracking the bus practical and killing it feasible. The third issue, that buses can be more easily hardened, is not generally true. Since it is the last stage of the vehicle, the weight penalties are the greatest for hardening the bus. Moreover, in order to deploy their RVs, buses must open up, making hardening more difficult."

Imaginary countermeasures

The Los Alamos and other reports refute in detail the claims of the arms controllers that ABM defense is useless, because the Soviet Union would be able to overwhelm and counter any defensive system. "As to the factors that 'conspire' to make directed energy BMD remote," the Los Alamos report concludes, "the first—that the defense of society [i.e., population centers—ed.]
doesn't make it any less worthwhile. The second—that 'for every defense concept . . . a countermeasure has already been identified'—is incorrect." The countermeasures make for heavier, less maneuverable boosters and "buses," and smaller warhead payloads—precisely what the boost-phase layer of defense is supposed to do. "The countermeasures were refuted in detail. No countermeasures have been put forward which could be implemented with 'today's technology.'"

Despite the magnitude of these reported achievements, it is important to remember that they *do not* exceed in quality, and fall short in depth of engineering quantity, what has been reported of the Soviet ABM program. The entire prospect for realizing the Strategic Defense Initiative could be lost overnight, if President Reagan allows Kissinger to convince him to "trade" the SDI for a Soviet return to Geneva. But if Reagan rejects the Kissinger route, we can build anti-missile defenses during this decade.

The OTA report is 'riddled with errors'

A stormy debate has broken out between defenders of the Strategic Defense Initiative at the Pentagon and Los Alamos National Laboratory, and opponents of the beam-weapon program at the Office of Technology Assessment of the U.S. Congress. Dr. Ashton Carter of the Massachusetts Institute of Technology had issued a paper in April 1984 for the OTA, titled "Directed Energy Missile Defense in Space." Four agencies, which Carter cites as contributors to his report, produce the following review, released by Deputy Secretary of Defense William H. Taft:

This report is a result of an Office of Technology Assessment contract with Ashton B. Carter of MIT, and it purports to address directed energy weapons (DEW) in the boost-phase intercept portion of ballistic missile defense (BMD) against intercontinental ballistic missiles (ICBM). . . . The author claims that the paper is based solely on unclassified material though he admits to having full access to classified information. . . .

The paper suffers from three fatal illnesses: 1) it is riddled with technical errors, 2) a number of the key assumptions upon which the paper is built are seriously in error, and 3) the choice of critical system design parameters which the author selects to illustrate concepts and design are inconsistent and ill-conceived.

With regard to technical errors the most significant deals with the basic constellation configuration used by the author. It is grossly inefficient and leads to large absentee ratios and linear dependencies upon system variables whereas more optimum constellation designs lead to absentee ratios smaller by factors of 2 to 10 and to square root dependencies upon system variables. This error alone can account, in some of the examples used by the author, for factors of 10 to 30 difference in the answers.

With regard to erroneous assumptions the key assumption the author made which leads to the largest error in his calculations is that the sophisticated and critical post-boost vehicle can be designed and built to be significantly harder than the booster. This assumption accounts for another factor of 2 to 3 difference in his results from those generated by others.

In summary, so serious are the errors contained within the report that it should not be taken seriously by anyone attempting to understand either the design approach to multi-tiered ballistic missile defense systems or the potential effectiveness of such systems.

EIR *asked OTA spokesman Peter Scharfman his view of this criticism of the OTA report. Here was his reply:*

We submitted these comments to some very distinguished and impartial reviewers and their conclusion is that there is no basis for withdrawing or for modifying this paper. . . . The Carter paper makes a distinction between what it calls a perfect defense and what it calls a less than perfect defense. Those are Carter's terms now—perfect defense and less than perfect defense. It goes in considerable detail into what it is a perfect defense would have to do in order to be a perfect defense and the kind of countermeasures that might be used against a defense that was trying to be perfect and the difficulty of coping with those countermeasures and it arrives at the judgment that a perfect defense—which I would describe as a defense of cities against an all-out attack on cities—is a very remote prospect and not one that is at this moment worth pursuing.

Pentagon: 'Withdraw the report!'

William H. Taft IV, Deputy Secretary of Defense, wrote this letter to Dr. John H. Gibbons, director of the OTA, on June 4:

On April 24, 1984 the Senate Foreign Relations Subcommittee on Arms Control, Oceans, International Operations, and Environment released a background paper prepared by Dr. Ashton Carter under the auspices of the Office of Technology Assessment. This paper, which I understand was neither reviewed nor approved by the Technology Assessment Board, contains serious technical errors. . . . In view of the serious errors of Dr. Carter's report, I ask that the Office of Technology Assessment withdraw the report. . . .

Gibbons replied:

. . . The main burden of your letter is the allegation that the paper "contains serious technical errors," as detailed in the document you enclosed. The OTA staff has reviewed these allegations and maintains that Dr. Carter's paper does not contain serious technical errors. . . . However, because of the extraordinary nature of your request that this paper be "formally withdrawn," I have asked several distinguished outsiders not associated with earlier reviews of Dr. Carter's paper to review his paper and your critique and to report back to me as soon as possible.

Taft to Gibbons, June 20:

We support your desire to have the issues regarding "Directed Energy Missile Defense in Space" reviewed by independent experts and offer to assist you in constituting the panel of experts. To assure credibility and independence of the panel, we suggest that your office consider nominations by this Department of experts believed to be qualified to serve on the panel, and that the identity of the panel members be made public after selection. . . .

It may prove useful for you and your staff . . . to consider some of the in-depth technical data upon which our comments were based. . . .

Taft provided for Gibbons's inspection the review by Los Alamos National Laboratory of the OTA report, which included the following summary conclusion:

The analysis in the OTA paper is technically flawed. When the errors are removed, the arguments lose most of their impact. . . . The OTA paper purports to demonstrate that the prospects for the SDI [Strategic Defense Initiative] are so remote that it is not worth executing. But the analysis provides no support for this conclusion, which must be viewed as essentially the personal opinion of the principal author of the report.

Gibbons to Taft, July 13:

. . . Because of the extraordinary nature of your request, and because of the very high importance which the Congress, the Technology Assessment Board, the OTA staff, and I all attach to the technical reliability of OTA's output, I took the unusual step of asking several distinguished outsiders to review the Background Paper and the critique which you enclosed with your letter. . . .

On the basis of the responses I have received from these reviewers, I have concluded that there are no technical errors or flawed assumptions that would seriously mislead either a lay or a technical reader. . . . While disagreements about details, analytical approaches, or the chances for success are inevitable in a complex subject where so much research remains to be done, the paper is a lucid, useful and generally reliable introduction to its subject.

Therefore, I do not believe it appropriate to withdraw the paper. . . .

Charles Townes, Professor of Physics at the University of California, Berkeley, and a Nobel Laureate, was one of the three indpendent experts enlisted by OTA's Taft to review the Carter report and the Los Alamos response. Questioned by EIR, *Townes declined to comment on the Los Alamos report. Asked whether he had read the Los Alamos critique, he replied, "I think so."*

Documentation

Reality refutes lies of anti-beam lobby

The Los Alamos National Laboratory's May 1984 report, "Comments on the OTA Paper on Directed Energy Missile Defense in Space," provides a point-by-point refutation of the lies and scientific frauds circulated by the arms-control lobby. We present here highlights of this debate.

Lie #1—'Soviets will use fake silos'

Bethe, Garwin, et al.:

. . . Many new missile silos could be constructed. Most of them could be comparatively inexpensive fakes arrayed in clusters about 1,000 kilometers across to exacerbate the satellites' absentee problem. The fake silos could house decoy ICBM's—boosters without expensive warheads or guidance packages—that would be indistinguishable from real ICBM's during boost phase. An attack could begin with a large proportion of decoys and shift to real ICBM's as the defense exhausted its weapons.

Reality: ***Los Alamos National Laboratory report, response to OTA's critique of beam defense, May 1984:***

The booster decoys would have to be in fact very good decoys to fool launch sensors. They would have to have the same weight and thrust as the actual booster. They would have to fly credible trajectories and they would have to be launched from very credible facilities. After all, we can see the ground. Thus, we can tell which holes they come out of. That means that these systems would have to be put into highly credible silos and launched out of those silos with full control systems. . . .

In fact, there is no payoff for launching over a few minutes. To achieve some penetration payoff (against a beam defense) they would have to launch their ICBMs within a few *seconds*. Launching within a few seconds is painful both operationally and also because of the timing of the attack, where the payoff comes from massive simultaneous *arrival* (at targets all over North America), not with simultaneous launch.

Lie #2—'Soviets can protect their boosters'

Bethe, Garwin, et al.:

Booster protection could take different forms. A highly reflective coating kept clean during boost phase by a strippable

foil wrapping would greatly reduce the damaging effect of an incident laser beam. A hydraulic cooling system could protect the attacked region. Aside from shortening the boost phase the attacking nation could also equip each booster with a thin metallic sheet that could be unfurled at a high altitude to absorb and deflect an X-ray pulse.

Reality: ***Los Alamos report:***

It is stated that there are a number of schemes to harden against x-rays. However, the most obvious and talked about schemes which the OTA gives are of *no* use by their own evaluation. They do not provide any useful decoupling of impulse from the target; they apply "virtually the same impulse as . . . direct impinging of x-rays." It is stated that shields could be designed for deployment in the boost phase without significant penalty. That is not the case by the OTA's own analyses. The x-ray laser is credited with the ability to shoot down to 80 km (48 miles), whereas atmospheric drag [against the booster—ed.]
miles). Therefore, there is a significant window of vulnerability where they [the shields—ed.]
and that is right where they are needed.

The discussion of shielding against neutral particle beams is technically incorrect. It is stated that a "few grams per square centimeter of lead" would provide adequate shielding. In fact 2 g/cm^2 amounts to only a few millimeters coating of lead. According to . . . the OTA Report, 250 MeV protons have ranges [i.e., can penetrate—ed.]
in lead, which at a density of 11 g/cc gives about 44 g/cm^2 for effective shielding. Thus, the OTA Report underestimates the thickness and weight of lead by about a factor of 20. What this amounts to in practice is that shielding an instrument package roughly 1 meter in diameter with lead would take about a ton of shielding material, which is essentially the weight of all the reentry vehicles. Thus, far from being small, the weight penalty for direct shielding against neutral particle beams is overwhelming. Simply said, the direct approach of shielding is not useful against neutral particle beams at all.

It is stated that the booster can easily be made to withstand 10,000 joules/cm^2. That is a very strong statement, which is backed up by no data. The statement that this hardness could be tripled with additional [heat shield—ed.]
ly theoretical. Spinning boosters is much easier to do on paper than it is in practice. Morever, it is not clear what penalties [e.g., in precision guidance of the missile—ed.]
associated with spinning a booster. Finally, for many of the engagements analyzed later, the kill times required are so short that there is not time for a single revolution. Therefore, hot-spot tracking would negate this effect. It is not clear that it would produce *any* further increases in hardening, let alone the factor of 3 quoted. The discussion of retrofitting hardening onto existing boosters is optimistic. Retrofitting tends to be a difficult problem; there is no firm estimate of the penalty in payload.

Lie #3—'Testing is impossible'

Bethe, Garwin, et al.:

Realistic testing of the system as a whole is obviously impossible and would have to depend largely on computer simulation.

Reality: ***Dr. Lowell Wood, Lawrence Livermore National Laboratory:***

The strategic defense systems created by each superpower and constituted of constellations of these platforms could be tested periodically and jointly during their erection, in order to build confidence in their correct and effective functioning, and in each other. Such joint exercises would also provide a convenient vehicle for attriting the inventory of offensive missiles, e.g., in mock attacks upon agreed-upon targets in the ocean.

The purpose of such deep space-based systems would be to guarantee defeat of a massive, salvo-type launch of ballistic missiles, whether launched from land or sea. They would obviously need to be supplemented by other types of strategic defense technology (e.g., popped-up systems) which would more effectively deal with "dribble launches" of a superpower's strategic rocket forces.

Of the comments made here only one requires a response: the "impossibility of testing the defensive system from end to end in a realistic wartime setting." For the area of command and control it is not. It is the one area in which the key computer and communication links can be properly stressed with synthesized data streams that are fed into the front end of the system—as is routinely done to test our existing strategic warning assets. Therefore, this one component can be tested both fully and realistically; the OTA has it exactly backwards.

Lie #4—'Target is invisible at great distance'

Bethe, Garwin, et al.:

. . . Whichever weapon were used, however, this enormous range would make it virtually impossible to exploit the radiation from the booster's flame to accurately fix an aim point on the target. The resolution of any optical instrument, whether it is an observing telescope or a beam-focusing mirror, is limited by the phenomenon of diffraction. The smallest spot on which a mirror can focus a beam has a diameter that depends on the wavelength of the radiation, the aperture of the instrument and the distance to the spot. . . .

Reality: ***Los Alamos report:***

Apparently the OTA is unaware that it is possible to track objects actively to higher precision than the diffraction limit of the telescope. When one has adequate beam power for illumination, one can do signal processing to locate the object being tracked to a finer resolution than the beam width. This is called beam division; it is done routinely in the radiofre-

quency phased array radar systems for conventional ballistic missile defense. The physics is the same in the visible. Thus, it is not true that the laser telescope has to have either a separate mirror or one as large as the intercept mirror.

Lie #5—'Too many beams would be required'

Ashton Carter, "Directed Energy Missile Defense in Space," report for the Congressional Office of Technology Assessment (OTA), 1984:

The U.S. would have to deploy an implausible system in which one laser or other directed energy weapon must be placed in orbit for every Soviet booster, in order to have enough laser stations within range of the Soviet launch sites at any given time of launch.

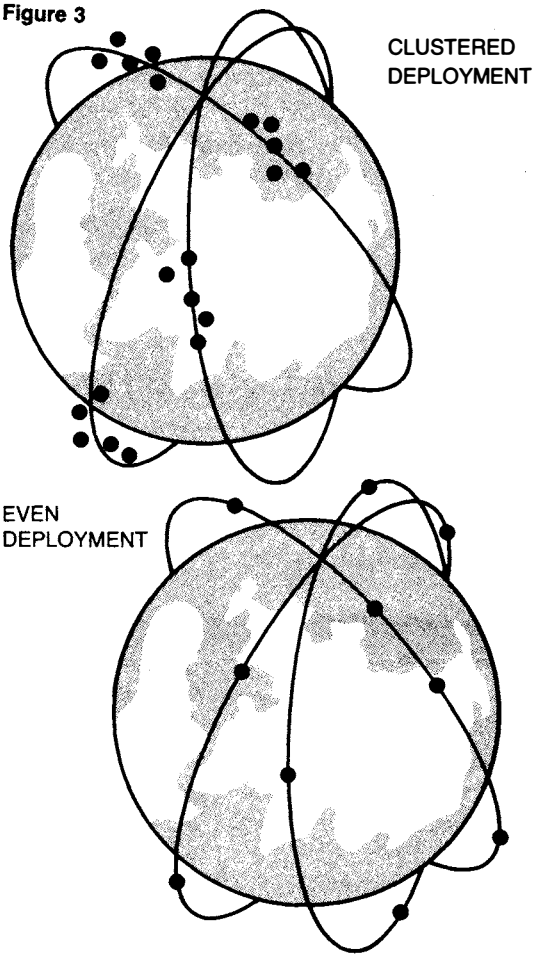
Reality: ***Los Alamos report:***

This material is misleading. The problem is illustrated by Fig. 3.5 [referring to a figure in the OTA report; see *EIR*'s Figure 3 for a similar representation—ed.],
constellation of hypothetical directed energy satellites with a 4,000 km (2400 mile) range. For the 4 orbital plane-8 position per plane configuration chosen, there are 32 satellite positions for coverage. In order to increase the number of satellites in orbit, the OTA simply increases the number of satellites at each one of those 32 points. Thus, to achieve a total of 160 battle stations they put five satellites at each one of the 32 points. This peculiar way of adding satellites to a constellation strongly distorts their subsequent results. . . . If instead, the additional satellites had been added *between* the satellites that were previously in the constellation, the average distance between satellites would have decreased significantly. The average range to the laser's target would also decrease causing its kill rate to increase. . . . When the examples on pages 20 and 21 are corrected for uniform satellite deployment, a few hundred satellites, which are not particularly bright, can handle a significant . . . threat.

Reality: ***Lt. Gen. James Abrahamson, Director of the Strategic Defense Initiative, Aug. 8, 1984:***

There is no way to avoid the absentees [beam weapons which are not within range of the Soviet ICBM fields at the time of launch of missiles—ed.],
useless weapons. They could defend against submarine-launched missiles firing from anywhere else on the globe. Some forms of directed energy weapons can engage ICBM reentry vehicles in midcourse. Other forms can efficiently attack decoys in midcourse and either destroy the simple ones, or make it easier to identify the replica decoys and avoid expending midcourse interceptors against them. Those forms of directed energy weapons that can penetrate deep into the atmosphere may be equipped to engage aircraft . . . anywhere in the world.

Figure 3



Distribution of defensive satellites in near earth orbit

Shown above are two ways of distributing a constellation of laser battle stations in near earth orbit to defend against ballistic-missile launches. The first one is that proposed by the OTA, in which the satellites are clustered at a few points along each orbit. According to both the Los Alamos National Laboratory and DoD Office of Strategic Defense, this configuration appears to have been chosen in order to decrease the efficiency and effectiveness of these battle stations. The second configuration shows the battle stations deployed evenly along their orbits. According to Los Alamos and the DoD, this second type of configuration is much more efficient and leads to a much smaller proportion of the defensive satellites being absent from the area of the launch.

Lie #6—'X-Ray lasers can't penetrate the atmosphere'

The Ashton Carter OTA Report claims that x-ray laser beams cannot penetrate the atmosphere for any significant distance from space, and therefore must wait until the booster is well out of the atmosphere to shoot at it. This argument is universally repeated by beam defense critics as a "law of nature."

Reality: ***Dr. Lowell Wood, Lawrence Livermore National Laboratory:***

No technically informed person has supported the assertion that x-ray laser beams cannot penetrate the earth's atmosphere sufficiently deeply to destroy the next century's ICBM's.

The Los Alamos report additionally cites experimental demonstration that x-ray beams can be made to penetrate down to 50 miles altitude (the earth's atmosphere extends up to 65-70 miles), and perhaps further.

Lie #7—'X-rays cannot be focussed by mirrors'

Carter, OTA report:

Since x-rays are not back-reflected by any kind of mirror, there is no way to direct the x-rays into a beam with optics like the visible and infrared lasers.

Reality: ***Los Alamos report:***

That is incorrect. Experimental x-ray optics have actually been developed, which enable one to perform the same sort of optics with x-rays that are done at longer wavelengths. Since x-ray optics do exist—in contradiction to what the OTA assumes—their divergence limit for the beam . . . and their limit for its energy, are both incorrect.

Lie #8—'Disruption effects of beams are unknown'

Carter, OTA report:

Effects on electronics of neutral particle beams, particularly transient disruption of computer circuits, are poorly known, complicated, and specific to the target.

Reality: ***Los Alamos report:***

Experience in the design and use of planetary probes by NASA has shown that those effects are very real, complicated in detail but simple in impact, universally encountered, and very difficult to overcome.

Lie #9—'Fast-burn boosters can't be intercepted'

Carter, OTA report:

The x-ray laser or neutral particle beam would stand no chance of intercepting a fast-burn booster (one which burns out while still in the atmosphere).

Reality: ***Los Alamos report:***

The supposed fundamental limit on x-ray lasers is simply incorrect. . . . Neutral particle beams would have very high effectiveness against post-boost vehicles, which are heavily dependent on electronics and can stand little interruption in their function, and on reentry vehicles, which are exposed for a very long time and very susceptible to particle beam effects in mid-course. . . . The OTA's own analysis actually supports the conclusion that particle beams of modest brightness could have a major capability against MX-like ICBMs. The neglect of the neutral particle beam's unique mid-course capability is a fatal omission from the OTA's analysis.

Lie #10—'Once the booster burns out, sensors won't find it'

Reality: ***Los Alamos report:***

In fact there is no need to attempt the re-acquisition [as targets—ed.] of post-boost phase vehicles. If one is watching the boost phase, one can establish a track, which is handed over to the post-boost phase kill platform. Once it is established, maintanence of the track of post-boost vehicles is not stressing.

Lie #11—'Beam weapons can't defend against submarine-launched missiles'

Carter, OTA report:

A layered system optimized for ICBM defense could not necessarily handle the SLBMs (submarine-launched ballistic missiles) as well.

Reality: ***Los Alamos report:***

A system that was configured to handle the full ICBM threat should in fact be *over*-designed by a wide margin to handle the SLBM threat, which is not concentrated either in space or in time. . . . "Beam weapons systems not over the Soviet Union," are in fact on station over those submarines, so there is no true absenteeism. It is stated that the SDI platforms would have less capability against SLBMs because of their short time of flight and depressed trajectories. Those are second order issues. They would have greater capability against those platforms because of their geographic dispersal and lower launch rates.

Lie #12—'There are other ways to deliver bombs'

Reality: ***Los Alamos report:***

That BMD will not protect the U.S. from other means of delivery—is wrong. It is not true that the "technical problems of air defense are no better resolved." We do not mount air defenses today simply because they are useless, if they can be flattened by ICBMs. The assertion that there are alternative schemes such as "commercial air liners, ships, packing crates, and diplomatic pouches" is without merit. There are adequate techniques today for non-obtrusively monitoring the passage of nuclear materials in microscopic amounts, let alone the kilogram amounts in nuclear weapons.