Special
Report
No. 129

The Strategic Defense Initiative

June 1985

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

In his speech of March 23, 1983, President Reagan presented his vision of a future in which nations could live secure in the knowledge that their national security did not rest upon the threat of nuclear retaliation but rather on the ability to defend against potential attacks. The Strategic Defense Initiative (SDI) research program is designed to determine whether and, if so, how advanced defensive technologies could contribute to the realization of this vision.

The Strategic Context

The U.S. SDI research program is wholly compatible with the Anti-Ballistic Missile (ABM) Treaty, is comparable to research permitted by the ABM Treaty which the Soviets have been conducting for many years, and is a prudent hedge against Soviet breakout from ABM Treaty limitations through the deployment of a territorial ballistic missile defense. These important facts deserve emphasis. However, the basic intent behind the Strategic Defense Initiative is best explained and understood in terms of the strategic environment we face for the balance of this century and into the next.

The Challenges We Face. Our nation and those nations allied with us face a number of challenges to our security. Each of these challenges imposes its own demands and presents its own opportunities. Preserving peace and freedom is, and always will be, our fundamental goal. The essential purpose of our military forces, and our nuclear forces in particular, is to deter aggression and coercion based upon the threat of military aggression. The deterrence provided by U.S. and allied military forces has permitted us to enjoy peace and freedom. However, the nature of the military threat has changed and will continue to change in very fundamental ways in the next decade. Unless we adapt our response, deterrence will become much less stable and our susceptibility to coercion will increase dramatically.

Our Assumptions About Deterrence. For the past 20 years, we have based our assumptions on how deterrence can best be assured on the basic idea that if each side were able to maintain the ability to threaten retaliation against any attack and thereby impose on an aggressor costs that were clearly out of balance with any potential gains, this would suffice to prevent conflict. Our idea of what our forces had to hold at risk to deter aggression has changed over time. Nevertheless, our basic reliance on nuclear retaliation provided by offensive nuclear forces, as the essential means of deterring aggression, has not changed over this period.

This basic idea—that if each side maintained roughly equal forces and equal capability to retaliate against attack, stability and deterrence would be maintained—also served as the foundation for the U.S. approach to the strategic arms limitation talks (SALT) process of the 1970s. At the time that process began, the United States con-

cluded that deterrence based on the capability of offensive retaliatory forces was not only sensible but necessary, since we believed at the time that neither side could develop the technology for defensive systems which could effectively deter the other side.

Today, however, the situation is fundamentally different. Scientific developments and several emerging technologies now do offer the possibility of defenses that did not exist and could hardly have been conceived earlier. The state of the art of defense has now progressed to the point where it is reasonable to investigate whether new technologies can yield options, especially non-nuclear options, which could permit us to turn to defense not only to enhance deterrence but to allow us to move to a more secure and more stable long-term basis for deterrence.

Of equal importance, the Soviet Union has failed to show the type of restraint, in both strategic offensive and defensive forces, that was hoped for when the SALT process began. The trends in the development of Soviet strategic offensive and defensive forces, as well as the growing pattern of Soviet deception and of noncompliance with existing agreements, if permitted to continue unchecked over the long term, will undermine the essential military balance and the mutuality of vulnerability on which deterrence theory has rested.

Soviet Offensive Improvements. The Soviet Union remains the principal threat to our security and that of our allies. As a part of its wide-ranging effort further to increase its military capabilities, the Soviet Union's improvement of its ballistic missile force, providing increased prompt, hard-target kill capability, has increasingly threatened the survivability of forces we have deployed to deter aggression. It has posed an especially immediate challenge to our land-based retaliatory forces and to the leadership structure that commands them. It equally threatens many critical fixed installations in the United States and in allied nations that support the nuclear retaliatory and conventional forces which provide our collective ability to deter conflict and aggression.

Improvement of Soviet Active Defenses. At the same time, the Soviet Union has continued to pursue strategic advantage through the development and improvement of active defenses. These active defenses provide the Soviet Union a steadily increasing capability to counter U.S. retaliatory forces and those of our allies, especially if our forces were to be degraded by a Soviet first strike. Even today, Soviet active defenses are extensive. For example, the Soviet Union possesses the world's only currently deployed antiballistic missile system, deployed to protect Moscow. The Soviet Union is currently improving all elements of this system. It also has the world's only deployed antisatellite (ASAT) capability. It has an extensive air defense network, and it is aggressively improving the quality of its radars, interceptor aircraft, and surface-to-air missiles. It also has a very extensive network of ballistic missile early warning radars. All of these elements provide them an area of relative advantage in strategic defense today and, with logical evolutionary improvement, could provide the foundation of decisive advantage in the future.

Improvement in Soviet Passive Defenses. The Soviet Union is also spending significant resources on passive defensive measures aimed at improving the survivability of its own forces, military command structure, and national leadership. These efforts range from providing rail and road mobility for its latest generation of ICBMs [intercontinental ballistic missiles] to extensive hardening of various critical installations.

Soviet Research and Development on Advanced Defenses. For over two decades, the Soviet Union has pursued a wide range of strategic defensive efforts, integrating both active and passive elements. The resulting trends have shown steady improvement and expansion of Soviet defensive capability. Furthermore, current patterns of Soviet research and development, including a longstanding and intensive research program in many of the same basic technological areas which our SDI program will address, indicate that these trends will continue apace for the foreseeable future. If unanswered, continued Soviet defensive improvements will further erode the effectiveness of our own existing deterrent, based as it is now almost exclusively on the threat of nuclear retaliation by offensive forces. Therefore, this longstanding Soviet program of defensive improvements, in itself, poses a challenge to deterrence which we must address.

Soviet Noncompliance and Verification. Finally, the problem of Soviet noncompliance with arms control agreements in both the offensive and defensive areas, including the ABM Treaty, is a cause of very serious concern. Soviet activity in constructing either new phased-array radar near Krasnoyarsk, in central Siberia, has very immediate and ominous consequences. When operational, this radar, due to its location, will increase the Soviet Union's capability to deploy a territorial ballistic missile defense. Recognizing that such radars would make such a contribution, the ABM Treaty expressly banned the construction of such radars at such locations as one of the primary mechanisms for ensuring the effectiveness of the treaty. The Soviet Union's activity with respect to this radar is in direct violation of the ABM Treaty.

Against the backdrop of this Soviet pattern of noncompliance with existing arms control agreements, the Soviet Union is also taking other actions which affect our ability to verify Soviet compliance. Some Soviet actions, like their increased use of encryption during testing, are directly aimed at degrading our ability to monitor treaty compliance. Other Soviet actions, too, contribute to the problems we face in monitoring Soviet compliance. For example, Soviet increases in the number of their mobile ballistic missiles, especially those armed with multiple, independently-targetable reentry vehicles, and other mobile systems, will make verification less and less certain. If we fail to respond to these trends, we could reach a point in the foreseeable future where we would have little confidence in our assessment of the state of the military balance or imbalance, with all that implies for our ability to control escalation during crises.

Responding to the Challenge

In response to this long-term pattern of Soviet offensive and defensive improvements, the United States is compelled to take certain actions designed both to maintain security and stability in the near term and to ensure these conditions in the future. We must act in three main areas.

Retaliatory Force Modernization. First, we must modernize our offensive nuclear retaliatory forces. This is necessary to reestablish and maintain the offensive balance in the near term and to create the strategic conditions that will permit us to pursue complementary actions in the areas of arms reduction negotiations and defensive research. For our part, in 1981 we embarked on our strategic modernization program aimed at reversing a long period of decline. This modernization program was specifically designed to preserve stable deterrence and, at the same time, to provide the incentives necessary to cause the Soviet Union to

join us in negotiating significant reductions in the nuclear arsenals of both sides.

In addition to the U.S. strategic modernization program, NATO is modernizing its longer range intermediate-range nuclear forces (LRINF). Our British and French allies also have underway important programs to improve their own national strategic nuclear retaliatory forces. The U.S. SDI research program does not negate the necessity of these U.S. and allied programs. Rather, the SDI research program depends upon our collective and national modernization efforts to maintain peace and freedom today as we explore options for future decision on how we might enhance security and stability over the longer term.

New Deterrent Options. However, over the long run, the trends set in motion by the pattern of Soviet activity, and the Soviets' persistence in that pattern of activity, suggest that continued long-term dependence on offensive forces may not provide a stable basis for deterrence. In fact, should these trends be permitted to continue and the Soviet investment in both offensive and defensive capability proceed unrestrained and unanswered, the resultant condition could destroy the theoretical and empirical foundation on which deterrence has rested for a generation.

Therefore, we must now also take steps to provide future options for ensuring deterrence and stability over the long term, and we must do so in a way that allows us both to negate the destabilizing growth of Soviet offensive forces and to channel longstanding Soviet propensities for defenses toward more stabilizing and mutually beneficial ends. The Strategic Defense Initiative is specifically aimed toward these goals. In the near term, the SDI program also responds directly to the ongoing and extensive Soviet antiballistic missile effort, including the existing Soviet deployments permitted under the ABM Treaty. The SDI research program provides a necessary and powerful deterrent to any near-term Soviet decision to expand rapidly its antiballistic missile capability beyond that contemplated by the ABM Treaty. This, in itself, is a critical task. However, the overriding, long-term importance of SDI is that it offers the possibility of reversing the dangerous military trends cited above by moving to a better, more stable basis for deterrence and by providing new and compelling incentives to the Soviet Union for seriously negotiating reductions in existing offensive nuclear arsenals.

The Soviet Union recognizes the potential of advanced defense concepts—especially those involving boost, postboost, and mid-course defenses—to change the strategic situation. In our investigation of the potential these systems offer, we do not seek superiority or to establish a unilateral advantage. However, if the promise of SDI technologies is proven, the destabilizing Soviet advantage can be redressed. And, in the process, deterrence will be strengthened significantly and placed on a foundation made more stable by reducing the role of ballistic missile weapons and by placing greater reliance on defenses which threaten no one.

Negotiation and Diplomacy. During the next 10 years, the U.S. objective is a radical reduction in the power of existing and planned offensive nuclear arms, as well as the stabilization of the relationship between nuclear offensive and defensive arms, whether on earth or in space. We are even now looking forward to a period of transition to a more stable world, with greatly reduced levels of nuclear arms and an enhanced ability to deter war based upon the increasing contribution of non-nuclear defenses against offensive nuclear arms. A world free of the threat of military aggression and free of nuclear arms is an ultimate objective to which we, the Soviet Union, and all other nations can agree.

To support these goals, we will continue to pursue vigorously the negotiation of equitable and verifiable agreements leading to significant reductions of existing nuclear arsenals. As we do so, we will continue to exercise flexibility concerning the mechanisms used to achieve reductions but will judge these mechanisms on their ability to enhance the security of the United States and our allies, to strengthen strategic stability, and to reduce the risk of war.

At the same time, the SDI research program is and will be conducted in full compliance with the ABM Treaty. If the research yields positive results, we will consult with our allies about the potential next steps. We would then consult and negotiate, as appropriate, with the Soviet Union, pursuant to the terms of the ABM Treaty, which provide for such consultations, on how deterrence might be strengthened through the phased introduction of defensive systems into the force structures of both sides. This commitment does not mean that we would give the Soviets a veto over the outcome anymore than the Soviets have a veto over our current strategic and intermediate-range programs. Our commitment in this regard reflects our recognition that, if our research yields appropriate results, we should seek to move forward in a stable way. We have already begun the process of bilateral discussion in Geneva needed to lay the foundation for the stable integration of advanced defenses into the forces of both sides at such time as the state of the art and other considerations may make it desirable to do so.

The Soviet Union's View of SDI

As noted above, the U.S.S.R. has long had a vigorous research, development, and deployment program in defensive systems of all kinds. In fact, over the last two decades the Soviet Union has invested as much overall in its strategic defenses as it has in its massive strategic offensive buildup. As a result, today it enjoys certain important advantages in the area of active and passive defenses. The Soviet Union will certainly attempt to protect this massive, long-term investment.

Allied Views Concerning SDI

Our allies understand the military context in which the Strategic Defense Initiative was established and support the SDI research program. Our common understanding was reflected in the statement issued following President Reagan's meeting with Prime Minister Thatcher in December, to the effect that:

First, the U.S. and Western aim was not to achieve superiority but to maintain the balance, taking account of Soviet developments;

Second, that SDI-related deployment would, in view of treaty obligations, have to be a matter for negotiations;

Third, the overall aim is to enhance, and not to undermine, deterrence; and,

Fourth, East-West negotiations should aim to achieve security with reduced levels of offensive systems on both sides.

This common understanding is also reflected in other statements since then—for example, the principles suggested recently by the Federal Republic of Germany that:

- The existing NATO strategy of flexible response must remain fully valid for the alliance as long as there is no more effective alternative for preventing war; and,
- The alliance's political and strategic unity must be safeguarded. There must be no zones of different degrees of security in the alliance, and Europe's security must not be decoupled from that of North America.

SDI Key Points

Following are a dozen key points that capture the direction and scope of the program:

1. The aim of SDI is not to seek superiority but to maintain the strategic balance and thereby assure stable deterrence.

A central theme in Soviet propaganda is the charge that SDI is designed to secure military superiority for the United States. Put in the proper context of the strategic challenge that we and our allies face, our true goals become obvious and clear. Superiority is certainly not our purpose. Nor is the SDI program offensive in nature. The SDI program is a research program aimed at seeking better ways to ensure U.S. and allied security, using the increased contribution of defenses—defenses that threaten no one.

2. Research will last for some years. We intend to adhere strictly to ABM Treaty limitations and will insist that the Soviets do so as well.

We are conducting a broad-based research program in full compliance with the ABM Treaty and with no decision made to proceed beyond research. The SDI research program is a complex one that must be carried out on a broad front of technologies. It is not a program where all resource considerations are secondary to a schedule. Instead, it is a responsible, organized research program that is aggressively seeking cost-effective approaches for defending the United States and our allies against the threat of nuclear-armed and conventionally armed ballistic missiles of all ranges. We expect that the research will proceed so that initial development decisions could be made in the early 1990s.

3. We do not have any preconceived notions about the defensive options the research may generate. We will not proceed to development and deployment unless the research indicates that defenses meet strict criteria.

The United States is pursuing the broadly based SDI research program in an objective manner. We have no preconceived notions about the outcome of the research program. We do not anticipate that we will be in a position to approach any decision to proceed with development or deployment based on the results of this research for a number of years.

We have identified key criteria that will be applied to the results of this research whenever they become available. Some options which could provide interim capabilities may be available earlier than others, and prudent planning demands that we maintain options against a range of contingencies. However, the primary thrust of the SDI research program is not to focus on generating options for the earliest development/deployment decision but options which best meet our identified criteria.

4. Within the SDI research program, we will judge defenses to be desirable only if they are survivable and cost effective at the margin.

Two areas of concern expressed about SDI are that deployment of defensive systems would harm crisis stability and that it would fuel a runaway proliferation of Soviet offensive arms. We have identified specific criteria to address these fears appropriately and directly.

Our survivability criterion responds to the first concern. If a defensive system were not adequately survivable, an adversary could very well have an incentive in a crisis to strike first at vulnerable elements of the defense. Application of this criterion will ensure that such a vulnerable system would not be deployed and, consequently, that the Soviets would have no incentive or prospect of overwhelming it.

Our cost-effectiveness criterion will ensure that any deployed defensive system would create a powerful incentive not to respond with additional offensive arms, since those arms would cost more than the additional defensive capability needed to defeat them. This is much more than an economic argument, although it is couched in economic terms. We intend to consider, in our evaluation of options generated by SDI research, the degree to which certain types of defensive systems, by their nature, encourage an adversary to try simply to overwhelm them with additional offensive capability while other systems can discourage such a counter effort. We seek defensive options which provide clear disincentives to attempts to counter them with additional offensive forces.

In addition, we are pressing to reduce offensive nuclear arms through the negotiation of equitable and verifiable agreements. This effort includes reductions in the number of warheads on ballistic missiles to equal levels significantly lower than exist today.

5. It is too early in our research program to speculate on the kinds of defensive systems—whether ground-based or space-based and with what capabilities—that might prove feasible and desirable to develop and deploy.

Discussion of the various technologies under study is certainly needed to give concreteness to the understanding of the research program. However, speculation about various types of defensive systems that might be deployed is inappropriate at this time. The SDI is a broad-based research program investigating many technologies. We currently see real merit in the potential of advanced technologies providing for a layered defense, with the possibility of negating a ballistic missile at various points after launch. We feel that the possibility of a layered defense both enhances confidence in the overall system and compounds the problem of a potential aggressor in trying to defeat such a defense. However, the paths to such a defense are numerous.

Along the same lines, some have asked about the role of nuclear-related research in the context of our ultimate goal of non-nuclear defenses. While our current research program certainly emphasizes non-nuclear technologies, we will continue to explore the promising concepts which use nuclear energy to power devices which could destroy ballistic missiles at great distances. Further, it is useful to study these concepts to determine the feasibility and effectiveness of similar defensive systems that an adversary may develop for use against future U.S. surveillance and defensive or offensive systems.

6. The purpose of the defensive options we seek is clear—to find a means to destroy attacking ballistic missiles before they can reach any of their potential targets.

We ultimately seek a future in which nations can live in peace and freedom, secure in the knowledge that their national security does not rest upon the threat of nuclear retaliation. Therefore, the SDI research program will place its emphasis on options which provide the basis for eliminating the general threat posed by ballistic missiles. Thus, the goal of our research is not, and cannot be, simply to protect our retaliatory forces from attack.

If a future president elects to move toward a general defense against ballistic missiles, the technological options that we explore will certainly also increase the survivability of our retaliatory forces. This will require a stable concept and process to manage the transition to the future we seek. The

concept and process must be based upon a realistic treatment of not only U.S. but Soviet forces and out-year programs.

7. U.S. and allied security remains indivisible. The SDI program is designed to enhance allied security as well as U.S. security. We will continue to work closely with our allies to ensure that, as our research progresses, allied views are carefully considered.

This has been a fundamental part of U.S. policy since the inception of the Strategic Defense Initiative. We have made a serious commitment to consult, and such consultations will precede any steps taken relative to the SDI research program which may affect our allies.

8. If and when our research criteria are met, and following close consultation with our allies, we intend to consult and negotiate, as appropriate, with the Soviets pursuant to the terms of the ABM Treaty, which provide for such consultations, on how deterrence could be enhanced through a greater reliance by both sides on new defensive systems. This commitment should in no way be interpreted as according the Soviets a veto over possible future defensive deployments. And, in fact, we have already been trying to initiate a discussion of the offense-defense relationship and stability in the defense and space talks underway in Geneva to lay the foundation to support such future possible consultations.

If, at some future time, the United States, in close consultation with its allies, decides to proceed with deployment of defensive systems, we intend to utilize mechanisms for U.S.-Soviet consultations provided for in the ABM Treaty. Through such mechanisms, and taking full account of the Soviet Union's own expansive defensive system research program, we will seek to proceed in a stable fashion with the Soviet Union.

9. It is our intention and our hope that, if new defensive technologies prove feasible, we (in close and continuing consultation with our allies) and the Soviets will jointly manage a transition to a more defense-reliant balance.

Soviet propagandists have accused the United States of reneging on commitments to prevent an arms race in space. This is clearly not true. What we envision is not an arms race; rather, it is just the opposite—a jointly managed approach designed to maintain, at all times, control over the mix of offensive and defensive systems of both sides and thereby increase the confidence of all nations in the effectiveness and stability of the evolving strategic balance.

10. SDI represents no change in our commitment to deterring war and enhancing stability.

Successful SDI research and development of defense options would not lead to abandonment of deterrence but rather to an enhancement of deterrence and an evolution in the weapons of deterrence through the contribution of defensive systems that threaten no one. *We would deter a potential aggressor by making it clear that we could deny him the gains he might otherwise hope to achieve rather than merely threatening him with costs large enough to outweigh those gains.*

U.S. policy supports the basic principle that our existing method of deterrence and NATO's existing strategy of flexible response remain fully valid, and must be fully supported, as long as there is no more effective alternative for preventing war. It is in clear recognition of this obvious fact that the United States continues to pursue so vigorously its own strategic modernization program and so strongly supports the efforts of its allies to sustain their own commitments to maintain the forces, both nuclear and conventional, that provide today's deterrence.

11. For the foreseeable future, offensive nuclear forces and the prospect of nuclear retaliation will remain the key element of deterrence. Therefore, we must maintain modern, flexible, and credible strategic nuclear forces.

This point reflects the fact that we must simultaneously use a number of tools to achieve our goals today while looking for better ways to achieve our goals over the longer term. It expresses our basic rationale for sustaining the U.S. strategic modernization program and the rationale for the critically needed national modernization programs being conducted by the United Kingdom and France.

12. Our ultimate goal is to eliminate nuclear weapons entirely. By necessity, this is a very long-term goal, which requires, as we pursue our SDI research, equally energetic efforts to diminish the threat posed by conventional arms imbalances, both through conventional force improvements and the negotiation of arms reductions and confidence-building measures.

We fully recognize the contribution nuclear weapons make to deterring conventional aggression. We equally recognize the destructiveness of war by conventional and chemical means, and the need both to deter such conflict and to reduce the danger posed by the threat of aggression through such means. ■

Published by the United States Department of State · Bureau of Public Affairs
Office of Public Communication · Editorial Division · Washington, D.C. · June 1985

*U.S. GOVERNMENT PRINTING OFFICE: 1985-461-789:20034

29 June 1986

TALKING POINTS

NEED FOR STRATEGIC DEFENSE DEPLOYMENT DECISION IN EARLY 1990s

- Reductions in the FY 1987 SDI budget request, coming after the cuts imposed in previous years, would force delays in the program which would severely threaten the ability of the President and Congress to make an informed decision in the early 1990s on whether to proceed with strategic defenses.

- The Fletcher Commission determined, and our SDI research has confirmed that the state of technologies will permit an informed decision in the early 1990s provided the research program receives the necessary support.

- The goal of an early 1990s' decision is essential for a number of reasons:

- Any well-managed, focused research program must have temporal as well as substantive goals. Otherwise there would be a real danger of endlessly-prolonged research. Thus, for example, President Kennedy's call for the United States to go to the moon by the end of the 1960s was vital to the success of the Apollo program.

- By forcing alterations in carefully-developed research plans, delays would inevitably increase the overall cost of the program. Furthermore, the quality of the research probably would suffer through lost momentum and difficulty in retaining key personnel.

- Above all, vital national security interests underlie the goal of an early 1990s' decision.

  -- The SDI, near-term strategic force modernization, and the pursuit of radical reductions in offensive nuclear forces, are necessary and complementary responses to Soviet offensive and defensive force developments. Any reduction in our commitment to one of those efforts would undermine our ability to realize the goals of the others.

  -- The continued build-up of Soviet offensive forces is likely to exacerbate further the instabilities inherent in the current East-West balance.

  -- In the defensive area, the Soviet Union is upgrading and expanding its ABM defenses around Moscow to the limit allowed by the ABM Treaty. Several other Soviet activities in "traditional" defenses against ballistic missiles violate or potentially violate the ABM Treaty. Taken together, Soviet ABM-related activities suggest that the USSR may be preparing an ABM defense of its national territory.

-- In addition, the USSR has been engaged since the late 1960s in active research and development on advanced technologies for defense against ballistic missiles. That program covers most of the same technologies being examined under the SDI, but represents a much greater investment over time of plant, capital and manpower.

-- An accelerated, focused SDI research program, leading to an informed decision in the early 1990s, is essential to deter any near-term Soviet breakout from the ABM Treaty, and to prevent the possibility that the USSR might eventually add a monopoly on advanced defenses against ballistic missiles to its existing offensive and defensive forces. Stretching out the SDI research program could seriously weaken our ability to perform this critical task, by either reducing -- or heightening Soviet doubts about -- our ability to respond in timely fashion to Soviet defensive force developments.

-- Most important, the SDI offers the promise of reversing the dangerous military trends of the past decades and moving to a more stable, secure deterrence based on the increasing contribution of defensive systems. That goal is far too important for the security of the United States and our allies to delay its realization.

THE STRATEGIC DEFENSE INITIATIVE (SDI)

- In March 1983, President Reagan challenged the American scientific community to determine if there are promising technologies that one day could be used to defend against attacking missiles and eventually render nuclear weapons impotent and obsolete.

- For a generation, the U.S. and her allies have been defenseless against a deliberate nuclear attack, accidental firings, or attacks by terrorists or rogue regimes.

- The U.S. presently deters nuclear attack by threatening retaliation. SDI offers a safer and more moral alternative: employing technology to protect people instead of threatening their annihilation.

- SDI is not a bargaining chip. Our research will be pursued as a vital component of the overall U.S. national security effort.

The Challenge and the Critics

- SDI is a research program, pure and simple. SDI is not a deployment plan.

- Like the challenge of Apollo, SDI is a revolutionary program that merits a full-scale national effort. New visions of the future naturally attract skeptics. Take a page from history:

> Heavier-than-air flying machines are impossible.
> --- British physicist Lord Kelvin, 1895

More recently:

> ...the President's 'Buck Rogers' missile defense scheme...cannot work....
> --- Walter Mondale, 1984

- SDI is a broad-based, exploratory program that taps the finest scientific minds to investigate a range of defensive options for America's future security. This research will lead toward an informed decision on defensive options in the early 1990s.

SDI Funding Must be Sustained and Comprehensive

- If fully funded, SDI will cost approximately $26 billion in the five fiscal years 1985-1989. By comparison, Social Security payments of $26 billion occur every two months.

- Some in Congress would cripple SDI with short-sighted budget cuts, forcing the scope of SDI research to shrink. This would have serious harmful effects on SDI progress.
  - -- Promising research areas would be abandoned, causing the termination of already funded contracts.
  - -- Early 1990s timetable for a decision on the project's technological feasibility would be postponed.
- Indeed, sustained research to date has already produced technical advances:
  - -- June 1984 -- a non-nuclear interceptor destroyed an unarmed warhead in mid-course.
  - -- Fall 1985 -- SDI scientists successfully compensated for atmospheric distortion of a laser beam pointed toward a rocket in flight.
  - -- June 1986 -- a self-guided missile intercepted a target moving at three times the speed of sound.
- All this has been achieved with sound financial management through SDI Office centralized planning and control. This is a program <u>that works</u>.

<u>SDI: Prudent Response to Existing Soviet Missile Defenses</u>

- The Soviet Union has an extensive effort to develop new strategic defense technologies. Recent Soviet developments include:
  - -- Significantly upgrading the world's only deployed Anti-Ballistic Missile defense system, which protects Greater Moscow.
  - -- Constructing a large missile tracking radar in Siberia, in violation of the 1972 ABM Treaty. This radar closes the <u>only</u> gap in Soviet missile detection coverage.
  - -- Deploying the world's only operational weapon for destroying satellites.
- Taken together, these plus other developments in Soviet missile defense, as well as the continuing Soviet offensive buildup, threaten our deterrent, which continues to be based solely on retaliatory forces.
- Why are the Soviets eager for the U.S. to negotiate SDI away? Answer: The Soviets recognize America's principal advantage: a free and creative society which can employ superior technology for enhanced security.

PUBLIC SUPPORT FOR SDI

The media and political opponents of SDI have found it convenient to present SDI in caricature, as the "so-called 'Star Wars' proposal." When the American people are asked to evaluate concepts, rather than the labels, they support SDI. Evidence:

ABC News (1/4/85 - 1/6/85)

Question: Do you favor or oppose developing such defensive weapons (which use lasers and particle beams to shoot down enemy missiles), or what? Responses:

Favor	49%
Oppose	44

Gallup Organization (1/25/85 - 1/28/85)

Question: Would you like to see the United States go ahead with the development of such a system (Star Wars) or space-based defense against nuclear attack, or not? Responses:

Yes, develop	52%
No, don't develop	38

SDI -- Enhance Peace/Safer World

Decision/Making/Information (2/8/86 - 2/9/86)

Question: Some people say that research on a defense against nuclear-armed missiles, such as SDI, is a good idea because it will help deter a Soviet attack, increase the chance of reaching an arms control agreement, and reduce the risk of war. Other people say that research on a defense against nuclear-armed missiles, such as SDI, is a bad idea because it will upset the balance of power between the U.S. and the U.S.S.R., accelerate the arms race, and increase the risk of war. Which statement is closer to your own opinion -- that research on a defense against nuclear armed missiles is a good idea or a bad idea? Responses:

Good idea	62%
Bad idea	31

Gallup Organization (1/25/85 - 1/28/85)

Question: In your opinion, would developing this system (Star Wars or space-based defense against nuclear attack) make the world safer from nuclear destruction or less safe? Responses:

Make world safer	50%
Make world less safe	32
No difference	11

SDI--Technical Feasibility

CBS News/New York Times (1/2/85 - 1/4/85)

Question: Ronald Reagan has proposed developing a defensive nuclear system in space that would destroy incoming missiles before they reach the United States, a system some people call Star Wars. Do you think such a system could work? Responses:

Yes	62%
No	23
Don't know/No answer	15

SDI--Arms Reduction

Louis Harris and Associates (3/2/85 - 3/5/85)

Question: President Reagan has proposed that the U.S. (United States) move ahead to develop a new defense system in outer space and on the ground. He described the possibilities of building laser-beam and particle-beam systems and stations in space and on the ground that could shoot down incoming nuclear missiles. Agree or disagree...Once the Russians knew we were successfully building a new anti-nuclear defense system, they would be much more willing to agree to a treaty that would halt the nuclear arms race. Responses:

Agree	52%
Disagree	44
Not sure	4

Gallup Organization (1/25/85 - 1/28/85)

Question: In your opinion, would the United States' developing this system Star Wars, a space-based defense against nuclear attack, increase or decrease the likelihood of reaching a nuclear arms agreement with the Soviet Union? Responses:

Increase	47%
Decrease	32
No difference	13

18 July 1986

Talking Points

SDI's Contribution to R&D

- The SDI request contains at a minimum $743 million for dual-use technology research, that is to say, research which is potentially applicable to both conventional and strategic defense problems.

- The overall Department of Defense Research and Development budget has not suffered as a result of our efforts in strategic defense. In fact, the real R&D budget has increased by over 10% each year since 1982. ~~(See Attached Charts.)~~

- Technologies developed within the SDI, such as the ATM technology demonstrated by the US Army's Flexible Light-Weight Agile Guidance Experiment (FLAGE), have great promise for countering the growing threat to our forces in Europe posed by conventionally armed, short-range ballistic missiles.

SDI's Contribution to Arms Control

- We believe the case is clear that a robust SDI program supports U.S. negotiating efforts in the short term and that, by reducing the utility of ballistic missiles, it holds real promise for facilitating U.S. efforts to achieve significant and stabilizing offensive arms reductions in the future.

- An attempt to hold research hostage for unilateral concessions on arms control is ill-conceived at any time, but it is particularly inappropriate at the present time when the United States is preparing a response to the more serious aspects of the latest Soviet proposal.

- The Congress should not award concessions to the Soviet Union which the Soviet Union has been unwilling to negotiate for itself.

A Good Month for Arms Control

AFTER A DARK spring, the arms control horizon is brightening. President Reagan, in May, had ruled that the United States would no longer be bound by terms of the SALT II treaty. The fainthearted feared this would put the kibosh on the Geneva talks. In fact, it merely fed into political currents already flowing in both capitals. The Soviets, declining to accept this rebuff as his last word, kept right on unfolding their negotiating position. This encouraged arms control advocates in the administration and Congress, who redoubled efforts to get Mr. Reagan back on their negotiating track. The latest reports hint at some success. Mr. Reagan is now said to be prepared to resume what will inevitably be a long, hard climb to a possible agreement with Moscow.

The deal coming into view would involve deep cuts in offensive arms and agreed restraints on the development and deployment of defensive arms. Sound familiar? This is the deal that became possible from the moment in 1983 when President Reagan unveiled his plan for a missile defense in space. Both supporters and opponents of his Strategic Defense Initiative, or Star Wars, could see that it deeply alarmed the Soviets—for its promise as a vehicle of American technological and economic challenge if not for its theoretical threat as a weapon of the future. For arms controllers, the point of the exercise became to exploit those Soviet apprehensions in order to trade off SDI against what American strategists have always agreed to be the prime Soviet strategic threat, Moscow's great store of land-based missiles with at least a hypothetical capability of a first strike against the United States.

Actually, getting something of value for SDI from the Russians has been only half the battle. The other half has been to induce Ronald Reagan and the powerful Pentagon civilian partisans of SDI to accept the idea of some sort of trade. For they believe in SDI, if not as a weapon then as an instrument of challenge to Moscow. There is no guarantee now that this half of the battle has been won, or will stay won, although Defense Secretary Caspar Weinberger's remarkable public lamentations are certainly indicative. Mr. Reagan has had great difficulty holding to a constant position.

The Soviets, however, appear to be offering a formula to allow continued research, the halting of which could not be convincingly verified in any event, but to bar deployment for some period of years. This would put off a decision on SDI to a different administration and a different set of circumstances. Meanwhile, in the cooling of the passions surrounding strategic defense, the two sides could work on cutting offensive arms. There are other provisions, but this is the heart of it. Nobody can know now whether a suitable and safe agreement can be reached, but it is certainly something worth negotiating hard for.

SOVIET STRATEGIC DEFENSE PROGRAMS

Released by the Department of Defense and Department of State, October 1985

SOVIET STRATEGIC DEFENSE PROGRAMS

The United States Government has not recognized the incorporation of Estonia, Latvia, and Lithuania into the Soviet Union. Other boundary representations on the maps are not necessarily authoritative.

The illustrations of Soviet strategic defense facilities and systems included in this publication are derived from various U.S. sources; while not precise in every detail, they are as authentic as possible.

Preface

In March 1983, President Reagan presented a dramatic new vision of a world in which we would no longer have to depend on nuclear weapons to prevent nuclear conflict. He presented that vision, and that challenge, in this way:

> What if free people could live secure in the knowledge that their security did not rest upon the threat of instant U.S. retaliation to deter a Soviet attack, that we could intercept and destroy strategic ballistic missiles before they reached our own soil or that of our allies?

The Strategic Defense Initiative (SDI), which the President announced that night, marks the first, essential step toward the realization of his ultimate goal. The SDI is a research program, designed to examine the promise of effective defenses against ballistic missiles based on new and emerging technologies. If such defenses prove feasible, they would provide for a more stable and secure method of preventing war in the future, through the increasing contribution of non-nuclear defenses which threaten no one.

The Strategic Defense Initiative has been the subject of much discussion within the United States and allied countries since its initiation. Such exchanges are essential in our free societies and can only help ensure that the vision behind the research program can be achieved. There has been comparatively little public discussion, however, about the trend in Soviet defensive as well as offensive forces which provides the essential backdrop to the SDI. Indeed, the Soviet Union has intentionally tried to mislead the public about its strategic defense activities.

As this publication documents, Soviet efforts in most phases of strategic defense have long been far more extensive than those of the United States. The USSR has major passive defense programs, designed to protect important assets from attack. It also has extensive active defense systems, which utilize weapons systems to protect national territory, military forces, or key assets. Soviet developments in the area of active defenses fall into three major categories: air defense; ballistic missile defense based on current technologies; and research and development on advanced defenses against ballistic missiles.

Important recent Soviet activities in strategic defenses include:

- Upgrading and expansion of the world's only operational Anti-Ballistic Missile (ABM) system around Moscow;
- Construction of the Krasnoyarsk ballistic missile detection and tracking radar that violates the 1972 ABM Treaty;
- Extensive research into advanced technologies for defense against ballistic missiles including laser weapons, particle beam weapons, and kinetic energy weapons;
- Maintenance of the world's only operational antisatellite (ASAT) system;
- Modernization of their strategic air defense forces; and
- Improvements in their passive defenses by maintaining deep bunkers and blast shelters for key personnel, and enhancing the survivability of some offensive systems through mobility and hardening.

The following pages examine in detail Soviet programs in defenses against ballistic missiles, air defense, and passive defense. A summary of key Soviet offensive

force developments is presented in the annex to this document, since those are critical to an understanding of the impact of Soviet strategic defense programs. Soviet offensive forces are designed to be able to limit severely U.S. and allied capability to retaliate against attack. Soviet defensive systems in turn are designed to prevent those retaliatory forces which did survive an attack from destroying Soviet targets.

Given the long-term trend in Soviet offensive and defensive force developments, the United States must act in three main areas to maintain security and stability both in near term and in the future.

First, we must modernize our offensive nuclear forces in order to ensure the essential military balance in the near term, and to provide the incentives necessary for the Soviet Union to join us in negotiating significant, equitable, and verifiable nuclear arms reductions.

Second, we must act now to start constructing a more reliable strategic order for the long term by examining the potential for future effective defenses against ballistic missiles. The Strategic Defense Initiative is a prudent and necessary response to the ongoing extensive Soviet anti-ballistic missile effort, including the existing Soviet deployments permitted under the ABM Treaty. The SDI provides a necessary and powerful deterrent to any near-term Soviet decision to expand rapidly its ABM capability beyond that permitted by the ABM Treaty. The overriding importance of the Strategic Defense Initiative, however, is the promise it offers of moving to a better, more stable basis for deterrence in the future and of providing new and compelling incentives to the Soviet Union to agree to progressively deeper negotiated reduction in offensive nuclear arms.

The third approach is one of negotiation and diplomacy. We are even now looking forward to a transition to a more stable world, with greatly reduced levels of nuclear arms and enhanced ability to deter war based upon the increasing contribution of non-nuclear defenses against offensive nuclear arms. Toward those ends, we are endeavoring at the negotiations in Geneva to achieve significant, equitable, and verifiable reductions in existing nuclear arsenals and to discuss with the Soviets the relationship between offensive and defensive forces and the possibility of a future transition to a more defense-reliant deterrence.

Caspar W. Weinberger

CASPAR W. WEINBERGER
Secretary of Defense

George P. Shultz

GEORGE P. SHULTZ
Secretary of State

Introduction

In the late 1960s, given the state of defensive technology at the time, the United States came to believe that deterrence could best be assured if each side were able to maintain the ability to threaten retaliation against any attack and thereby impose on an aggressor costs that were clearly beyond any potential gains. That concept called for a reduction by both the Soviet Union and the United States in their strategic defensive forces, the maintenance of a balance between the two sides' offensive nuclear forces, and negotiated nuclear arms reductions which would maintain the balance at progressively lower levels.

In accordance with those principles, the United States exercised great restraint in offensive nuclear arms and at the same time dramatically lowered its defensive forces. Thus, we removed most of our defenses against Soviet bombers; decided to maintain a severely limited civil defense program; ratified the 1972 Anti-Ballistic Missile (ABM) Treaty, which placed strict limits on U.S. and Soviet defenses against ballistic missiles; and then deactivated the one ABM site which we were allowed under that Treaty. The basic idea that stability and deterrence would be maintained if each side had roughly equal capability to retaliate against attack also served as the foundation for the U.S. approach to the Strategic Arms Limitation Talks (SALT) process of the 1970s.

The Soviet Union, however, failed to show the type of restraint, in both strategic offensive and defensive forces, that the United States hoped for when the SALT process began. The USSR has consistently refused to accept meaningful and verifiable negotiated reductions in offensive nuclear arsenals. Since the late 1960s, the Soviets have greatly expanded and modernized their offensive nuclear forces and invested an approximately equal sum in strategic defenses. The USSR has an extensive, multifaceted operational strategic defensive network which dwarfs that of the United States as well as an active research and development program in both traditional and advanced defenses against ballistic missiles. Soviet noncompliance with arms control agreements in both the offensive and defensive areas, including the ABM Treaty, is a cause of very serious concern. The aggregate of current Soviet ABM and ABM-related activities suggest that the USSR may be preparing an ABM defense of its national territory — precisely what the ABM Treaty was designed to prevent.

Soviet offensive and defensive force developments pose a serious challenge to the West. If left unchecked and unanswered, they would undermine our ability to retaliate effectively in case of Soviet attack. The situation would be even more severe if the Soviet Union were to have a monopoly on advanced defenses against ballistic missiles in addition to its sizable offensive and defensive forces. In that case, the USSR might come to believe that it could launch a nuclear attack against the United States or our allies without fear of effective retaliation. At the very least, it might see a realistic chance of successful nuclear blackmail.

Soviet Strategic Defense Programs

The Soviet Approach

The Soviet emphasis on strategic defense is firmly grounded in Soviet military doctrine and strategy, which call for the following actions in the event of nuclear war:

- destruction and disruption of the West's nuclear-associated command, control, and communications;
- destruction or neutralization of as many of the West's nuclear weapons as possible on the ground or at sea before they could be launched;
- interception and destruction of surviving weapons — aircraft and missiles — before they reached their targets; and
- protection of the Party, the State, military forces, industrial infrastructure, and the essential working population against those weapons that survived attacks by Soviet offensive forces.

In pursuit of these goals the USSR puts considerable stress on a need for effective strategic defenses as well as offensive forces. In the Soviet view, the USSR could best achieve its aims in any nuclear war if it attacked first, destroying much of the U.S. and allied capability for retaliation. Defensive measures, both active and passive, would in turn prevent those enemy forces that survived a Soviet first-strike from destroying targets in the USSR.

Marshall V. D. Sokolovskiy, in *Military Strategy* — the basic Soviet strategic treatise, originally published in 1962 — defined the aim of Soviet strategic defenses in this way: "They have the task of creating an invincible system for the defense of the entire country. ... While, in the last war, it was sufficient to destroy 15-20 percent of the attacking air operation, now it is necessary to assure, essentially, 100 percent destruction of all attacking airplanes and missiles."

Soviet offensive and defensive force developments over the past 25 years demonstrate that the strategy articulated by Sokolovskiy still applies. The following pages present a detailed description of the actions undertaken by the Soviets in the area of strategic defenses. In order to explain the totality of the Soviet strategic military effort, a description of offensive force developments is provided in the annex to this document.

Defensive Forces

Over the last 25 years the Soviets have increased their active and passive defenses in a clear and determined attempt to blunt the effect of U.S. and allied retaliation to any Soviet attack. Passive defenses are non-weapons measures — such as civil defense and hardening — which protect important assets against attack. Active defenses utilize weapon systems to protect national territory, military forces, or key assets.

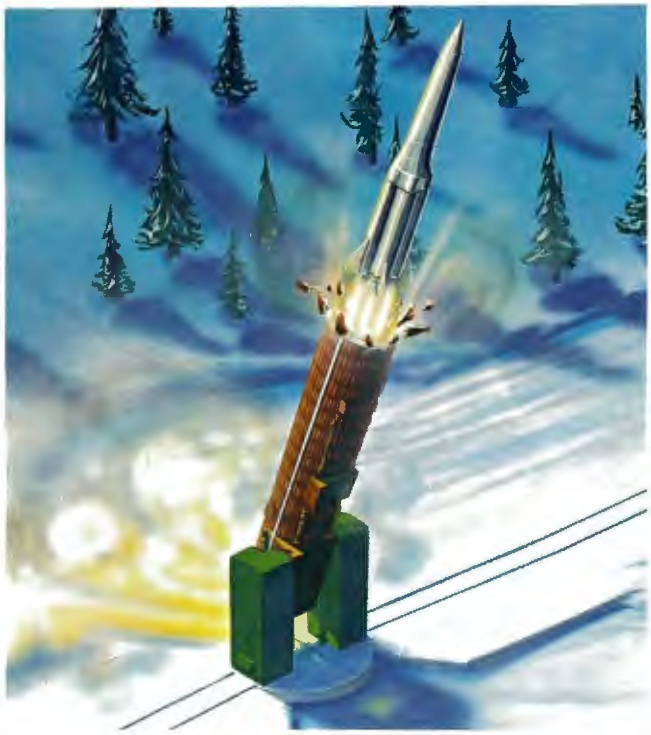
Evidence of the importance the Soviets attach to defensive damage-limitation can be traced back to the beginning of the nuclear age. National Air Defense became an independent service in the late 1950s and since 1959 has generally ranked third in precedence within the Soviet Armed Forces, following the Strategic Rocket Forces and the Ground Forces.

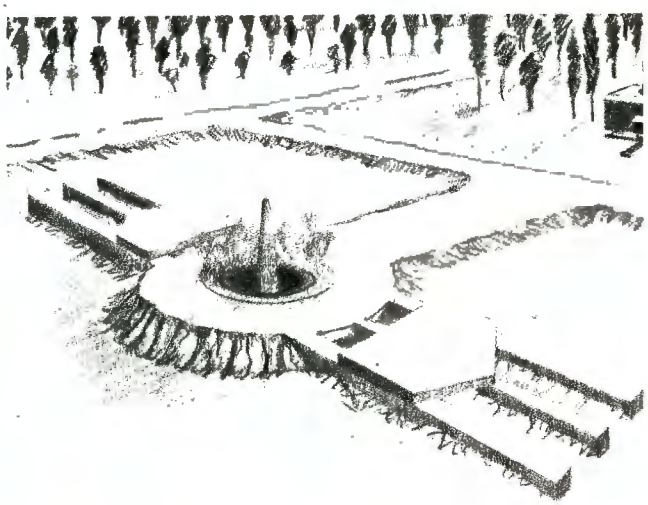
By the mid-1960s, two new mission areas — antisatellite defense and anti-missile defense — were added to the National Air Defense mission. As a result, the Soviet Union has the world's only operational anti-satellite (ASAT) system, which has an effective capability to seek and destroy critical U.S. satellites in low-earth orbit. In addition, Soviet efforts to attain a viable strategic defense against ballistic missiles have resulted in the world's only operational ABM system and a large and expanding research and development program.

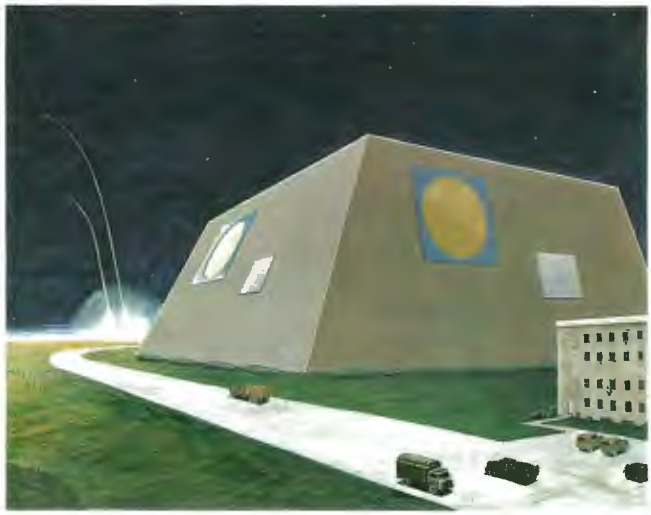
The Soviet emphasis on the necessity of research into defenses against ballistic missiles was demonstrated by then-Minister of Defense Grechko shortly after the signing of the ABM Treaty in 1972, when he told the Soviet Presidium that the Treaty "places no limitations whatsoever on the conducting of research and experimental work directed towards solving the problem of defending the country from nuclear missile strikes."

Ballistic Missile Defense

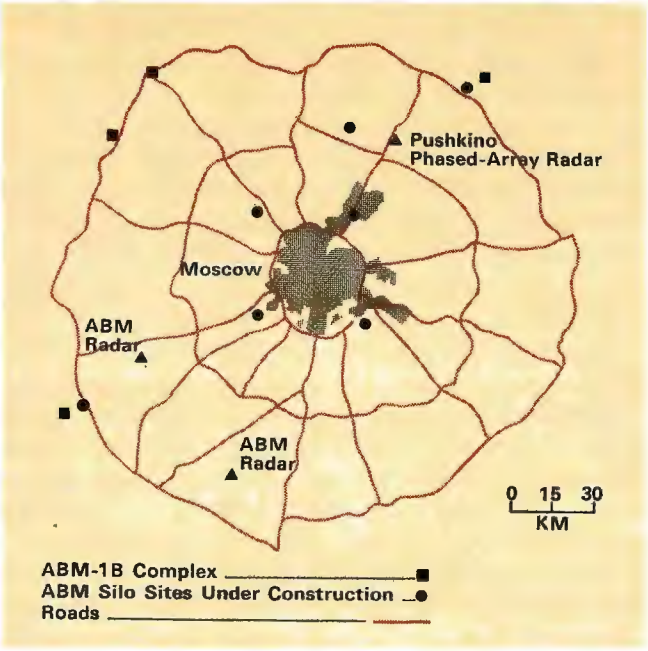
The Soviets maintain the world's only operational ABM system around Moscow. In 1980, they began to upgrade and expand that system to the limit allowed by the 1972 ABM Treaty. The original single-layer Moscow ABM system included 64 reloadable above-ground launchers at four complexes and DOG HOUSE and CAT HOUSE battle management radars south of







Moscow Ballistic Missile Defense

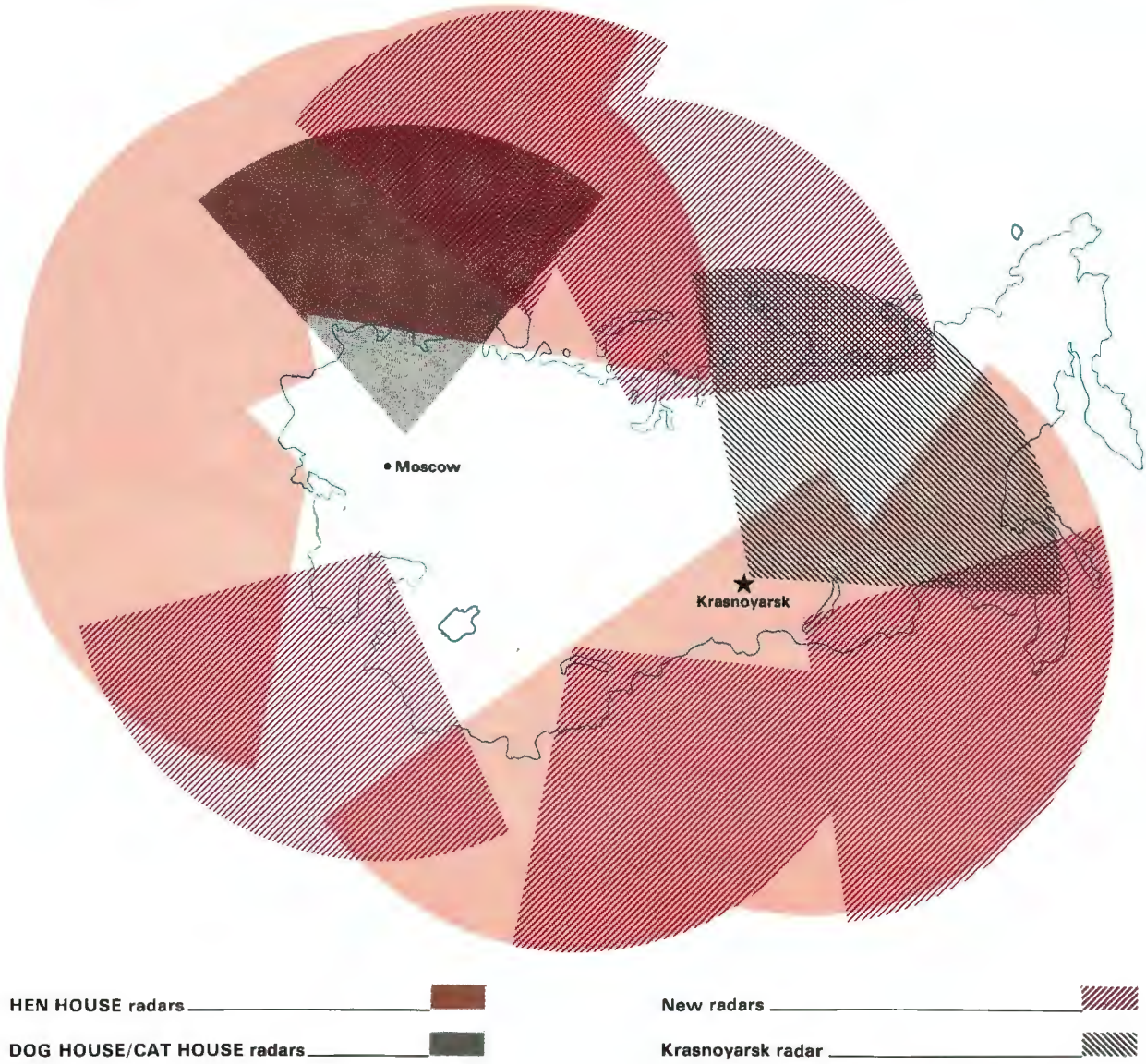


The Moscow ballistic missile defenses identified in map at right include the Pushkino ABM radar, above, GALOSH anti-ballistic missile interceptors, top left, and new silo-based high-acceleration interceptors, top right.

Moscow. Each complex consisted of TRY ADD tracking and guidance radars and GALOSH interceptors (nuclear-armed, ground-based missiles designed to intercept warheads in space shortly before they reenter the Earth's atmosphere).

When completed, the modernized Moscow ABM system will be a two-layer defense composed of: silo-based, long-range, modified GALOSH interceptors; silo-based, high-acceleration interceptors designed to engage targets within the atmosphere; associated engagement and guidance radars; and a new large radar at Pushkino designed to control ABM engagements. The silo-based launchers may be reloadable. The new system will have the 100 ABM

Ballistic Missile Early Warning, Target-Tracking, and Battle Management

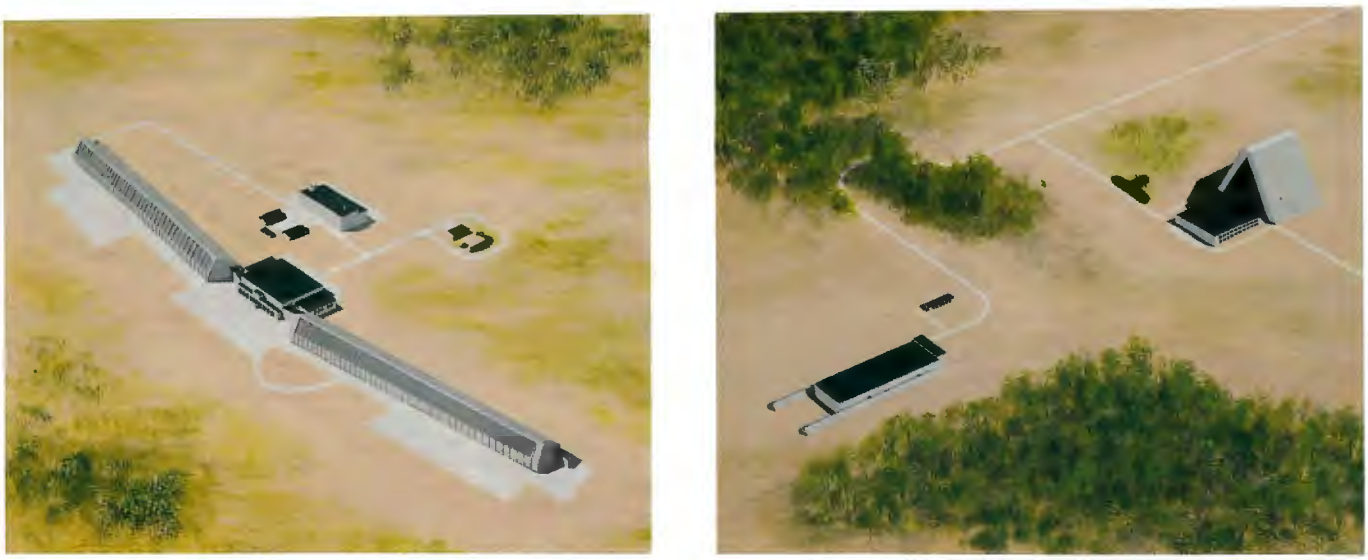


launchers permitted by the ABM Treaty and could be fully operational by 1987.

The Soviet system for detection and tracking of ballistic missile attack consists of a launch-detection satellite network, over-the-horizon radars, and a series of large phased-array radars.

The current launch-detection satellite network can provide about 30 minutes warning of any U.S. ICBM launch and determine the general origin of the missile. Two over-the-horizon radars directed at the U.S. ICBM fields also could give 30 minutes warning.

The next operational layer of ballistic missile detection consists of 11 large HEN HOUSE ballistic missile early warning radars at six locations on the periphery of the USSR. These radars can distinguish the size of an attack, confirm the warning from the satellite and over-the-horizon radar systems, and provide target-tracking data in support of anti-ballistic missile forces.



The 11 large HEN HOUSE ballistic missile early warning radars, at left, at six locations on the periphery of the USSR provide warning and target-tracking data in support of the Soviet ABM system. The DOG HOUSE radar, at right, provides battle management for the anti-ballistic missile interceptors around Moscow.

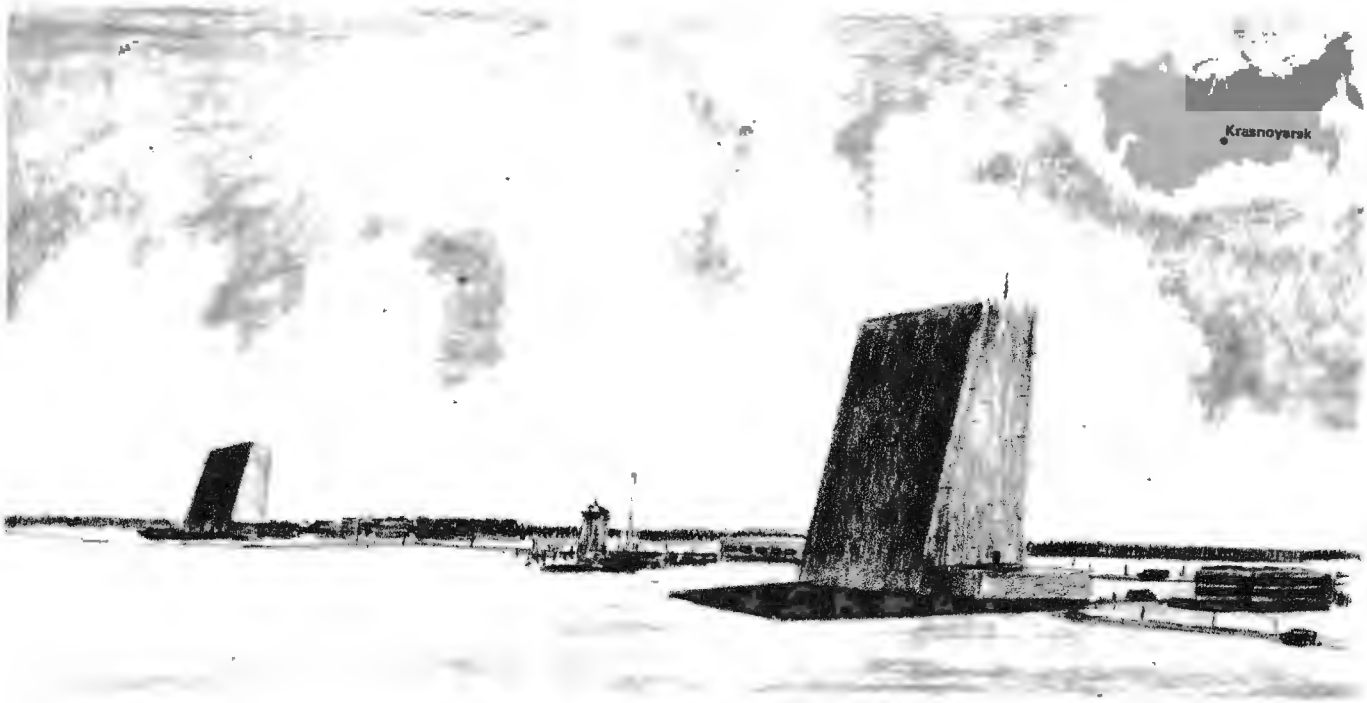
The Soviets are now constructing a network of six new large phased-array radars that can track more ballistic missiles with greater accuracy than the existing HEN HOUSE network. Five of these radars duplicate or supplement the coverage of the HEN HOUSE network, but with greatly enhanced capability. The sixth, under construction near Krasnoyarsk in Siberia, closes the final gap in the Soviet early warning radar coverage against ballistic missile attack. Together, the six new large phased-array radars form an arc of coverage from the Kola Peninsula in the northwest Soviet Union, around Siberia, to the Caucasus in the southwest.

The United States is now constructing new ballistic missile early warning radars, known as PAVE PAWS, that are located on the periphery of our territory and oriented outward. Both the U.S. and the USSR, in signing the ABM Treaty, recognized the need for ballistic missile early warning radars. At the same time, they recognized that ballistic missile early warning radars can detect and track warheads at great distances and therefore have a significant anti-ballistic missile potential. Such an ABM capability would play an important role in a nationwide ABM defense, which the Treaty was designed to prevent. As a result, the U.S. and the Soviet Union agreed that future ballistic missile early warning radars must be located on a nation's periphery and oriented outward. In that way, the desirable and legitimate goal of early warning could be advanced while minimizing the danger that an effective nationwide battle management network could result.

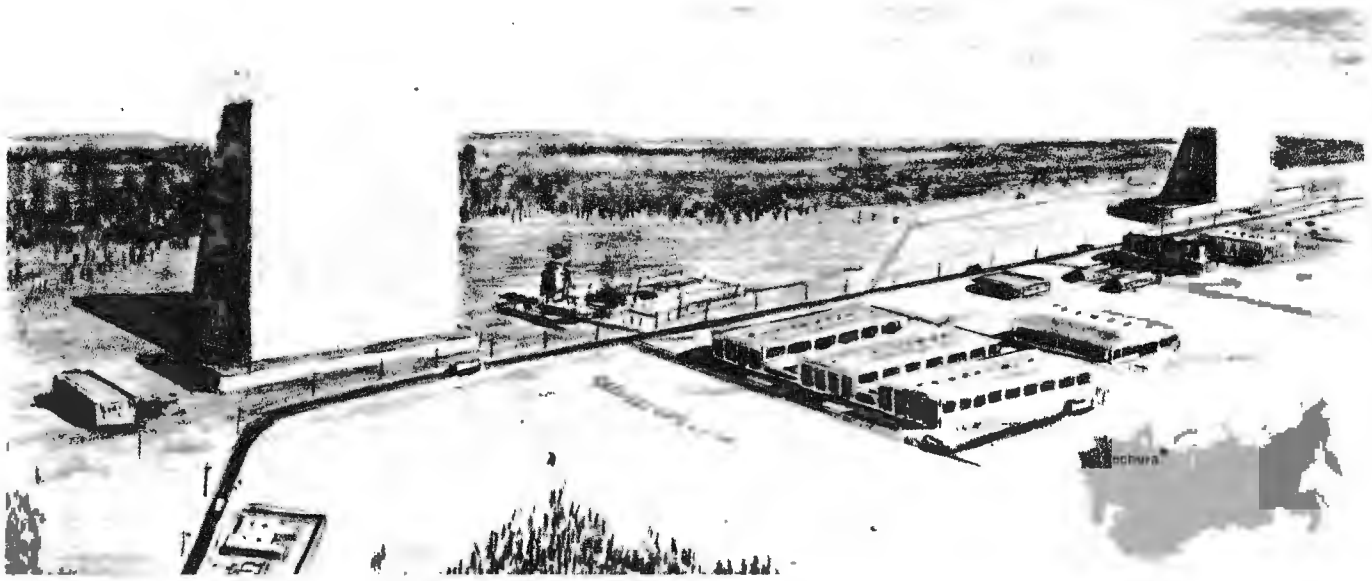
The Krasnoyarsk radar is designed for ballistic missile detection and tracking, including ballistic missile early warning, and violates the 1972 ABM Treaty. It is not located within a 150-kilometer radius of the national capital (Moscow) as required of ABM radars, nor is it located on the periphery of the Soviet Union and pointed outward as required for early warning radars. It is 3,700 kilometers from Moscow and is situated some 750 kilometers from the nearest border — Mongolia. Moreover, it is oriented not toward that border, but across approximately 4,000 kilometers of Soviet territory to the northeast.

The Soviet Union has claimed that the Krasnoyarsk radar is designed for space tracking, rather than ballistic missile early warning, and therefore does not violate the ABM Treaty. Its design, however, is not optimized for a space-tracking role, and the radar would, in any event, contribute little to the existing Soviet

space tracking network. Indeed, the design of the Krasnoyarsk radar is essentially identical to that of other radars that are known — and acknowledged by the Soviets — to be for ballistic missile detection and tracking, including ballistic missile early warning. Finally, it



The Soviet Union is violating the ABM Treaty through the siting, orientation and capability of the large phased-array, ballistic missile detection and tracking radar at Krasnoyarsk.



The receiver and transmitter of the large phased-array, ballistic missile detection and tracking radar at Pechora. The design of the Krasnoyarsk radar is essentially identical to that of the Pechora radar. Unlike the Pechora radar, however, the Krasnoyarsk radar does not meet the ABM Treaty requirement that early warning radars be located on the periphery of the Soviet Union and be oriented outward.

closes the last remaining gap in Soviet ballistic missile detection coverage. The Krasnoyarsk radar, therefore, is being constructed in direct violation of the ABM Treaty.

The growing Soviet network of large phased-array ballistic missile detection and tracking radars, of which the Krasnoyarsk radar is a part, is of particular concern when linked with other Soviet ABM efforts. Such radars take years to construct; their existence might allow the Soviet Union to move rather quickly to construct a nationwide ABM defense if it chooses to do so. The Soviets are also developing components of a new ABM system which apparently are designed to allow them to construct individual ABM sites in a matter of months, rather than the years that are required for more traditional ABM systems. Soviet activities in this regard potentially violate the ABM Treaty's prohibition on the development of a mobile land-based ABM system or components. We estimate that by using these components, the Soviets could undertake rapidly-paced ABM deployments to strengthen the defenses of Moscow and defend key targets in the western USSR and east of the Urals by the early 1990s.

In addition, the Soviets have probably violated the prohibition on testing surface-to-air missile (SAM) components in an ABM mode by conducting tests involving the use of SAM air defense radars in ABM-related testing activities. Moreover, the SA-10 and SA-X-12 SAM systems may have the potential to intercept some types of strategic ballistic missiles.

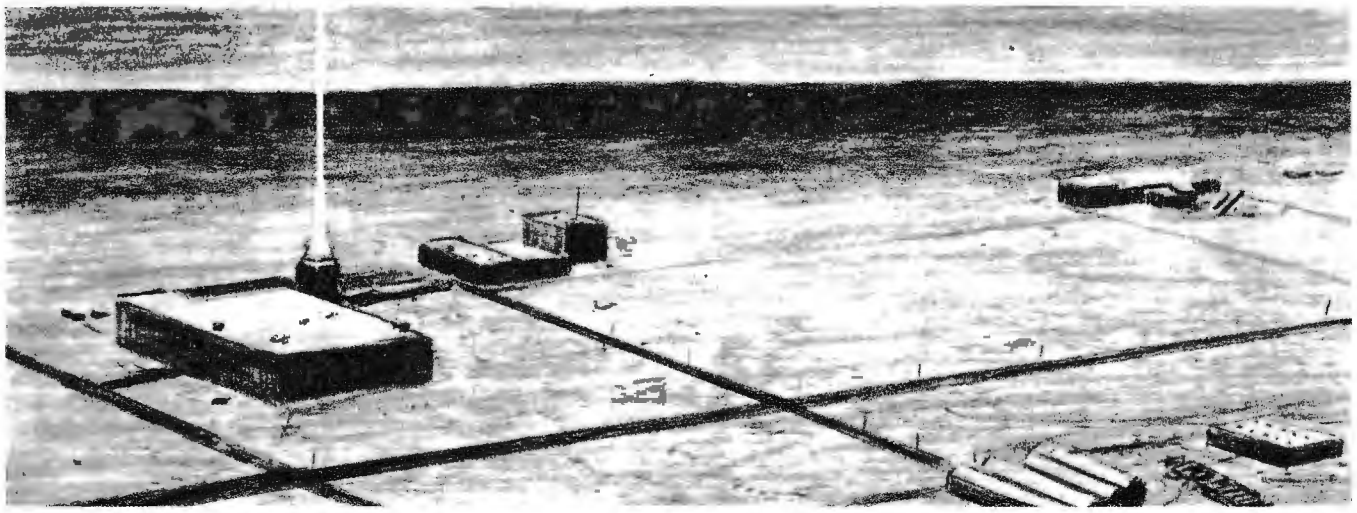
Taken together, all of the Soviet Union's ABM and ABM-related activities are more significant — and more ominous — than any one considered individually. Cumulatively, they suggest that the USSR may be preparing an ABM defense of its national territory.

Advanced Technologies for Defense Against Ballistic Missiles

In the late 1960s, in line with its long-standing emphasis on strategic defense, the Soviet Union initiated a substantial research program into advanced technologies for defense against ballistic missiles. That program covers many of the same technologies involved in the U.S. Strategic Defense Initiative, but represents a far greater investment of plant space, capital, and manpower.

Laser Weapons

The USSR's laser program is much larger than U.S. efforts and involves over 10,000 scientists and engineers and more than a half dozen major research and development facilities and test ranges. Much of this research takes place at the Sary Shagan Missile Test Center where the Soviets also conduct traditional ABM research. Facilities there are estimated to include several air defense lasers, a laser that



The directed-energy R&D site at Sary Shagan proving ground includes ground-based lasers that could be used in an antisatellite role today and possibly a ballistic missile defense role in the future.

may be capable of damaging some components of satellites in orbit, and a laser that could be used in feasibility testing for ballistic missile defense applications. A laser weapon program of the magnitude of the Soviet effort would cost roughly $1 billion per year in the U.S.

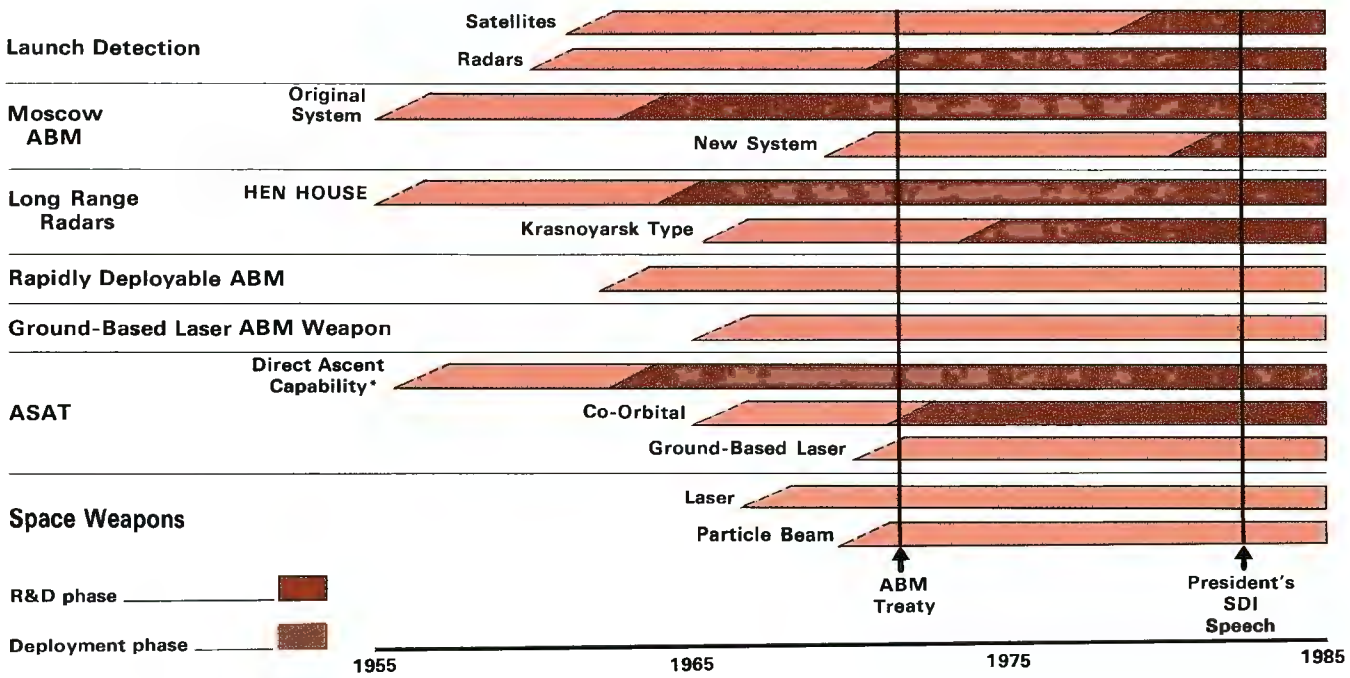
The Soviets are conducting research in three types of gas lasers considered promising for weapons applications: the gas-dynamic laser; the electric discharge laser; and the chemical laser. Soviet achievements in this area, in terms of output power, have been impressive. The Soviets are also aware of the military potential of visible and very short wave-length lasers. They are investigating excimer, free-electron, and x-ray lasers, and have been developing argon-ion lasers for over a decade.

The Soviets appear generally capable of supplying the prime power, energy storage, and auxiliary components needed for most laser and other directed-energy weapons. They have developed a rocket-driven magnetohydrodynamic generator which produces over 15 megawatts of electrical power — a device that has no counterpart in the West. The Soviets may also have the capability to develop the optical systems necessary for laser weapons to track and attack their targets. Thus, they produced a 1.2-meter segmented mirror for an astrophysical telescope in 1978 and claimed that this was a prototype for a 25-meter mirror that would be constructed in the future. A large mirror is considered necessary for a space-based laser weapon.

Unlike the U.S., the USSR has now progressed in some cases beyond technology research. It already has ground-based lasers that could be used to interfere with U.S. satellites, and could have prototype space-based antisatellite laser weapons by the end of the decade. The Soviets could have prototypes for ground-based lasers for defense against ballistic missiles by the late 1980s, and could begin testing components for a large-scale deployment system in the early 1990s.

The remaining difficulties in fielding an oper-

Soviet ABM/Space Defense Programs



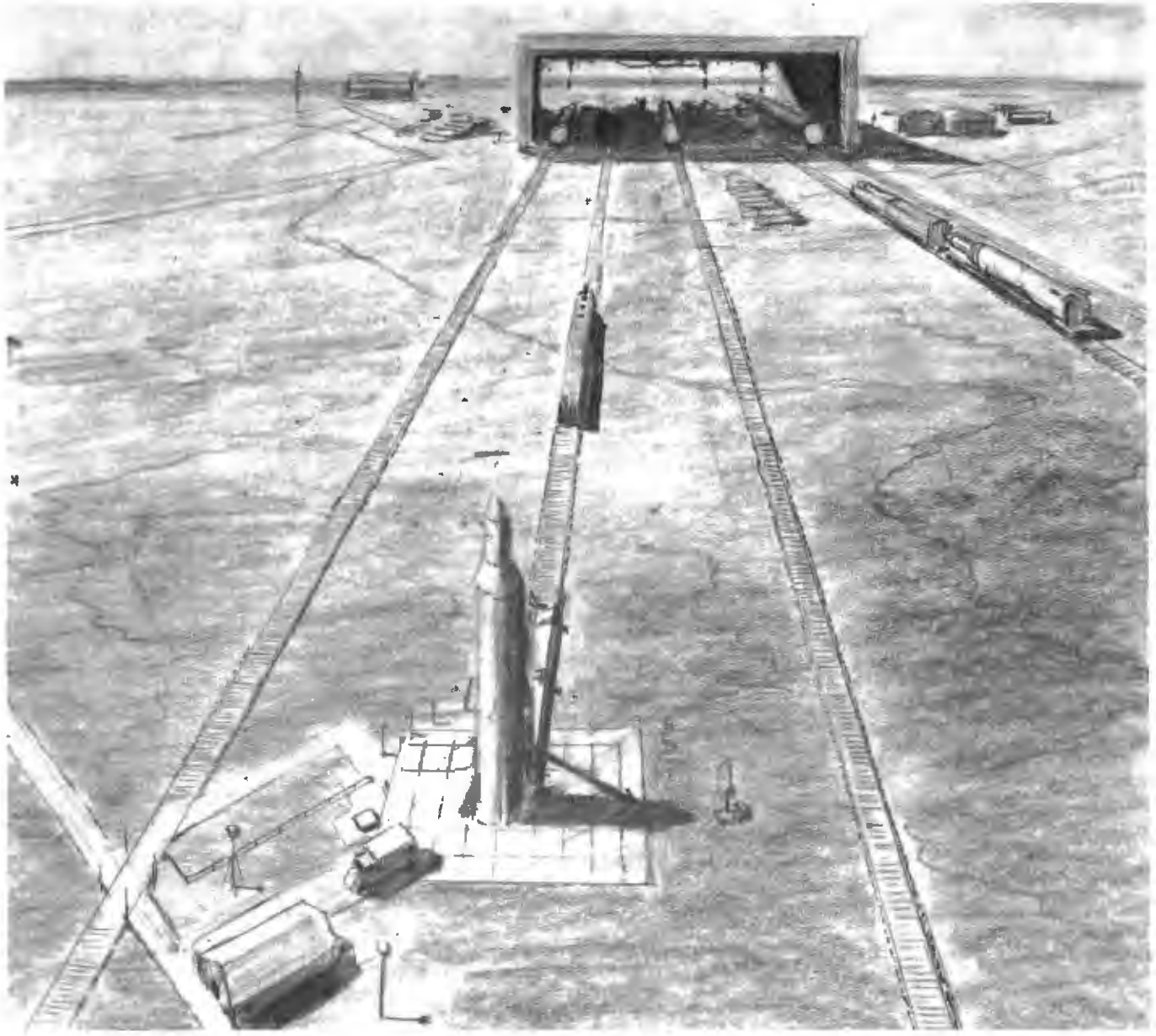
Soviet programs for ABM and Space Defense, which include advanced technologies and space based weapons, were in place prior to the 1972 ABM Treaty and have continued to expand in scope and size. During the same time period, U.S. ABM/Space Defense research has been limited in scope as well as the level of effort in terms of resources invested.

*Potential capability of the Moscow ABM system.

ational system will require still more development time. An operational ground-based laser for defense against ballistic missiles probably could not be deployed until the late 1990s, or after the year 2000. If technology developments prove successful, the Soviets may deploy operational space-based antisatellite lasers in the 1990s, and might be able to deploy space-based laser systems for defense against ballistic missiles after the year 2000.

Particle Beam Weapons

Since the late 1960s, the Soviets have been involved in research to explore the feasibility of space-based weapons that would use particle beams. We estimate that they may be able to test a prototype particle beam weapon intended to disrupt the electronics of satellites in the 1990s. A weapon designed to destroy satellites could follow later. A weapon capable of physically destroying missile boosters or



The USSR's operational antisatellite interceptor is launched from the Tyuratam Space Complex, where two launch pads and storage for additional interceptors and launch vehicles are available.

The Soviet orbital antisatellite (ASAT) weapon is operational and designed to destroy space targets with a multi-pellet blast.

warheads probably would require several additional years of research and development.

It is still uncertain whether ground-based charged particle-beam weapons are feasible — that is, whether the beam will propagate in the atmosphere. A space-based neutral particle beam weapon, however, would not be affected by the atmosphere or by the earth's magnetic field.

Soviet efforts in particle beams, and particularly on ion sources and radio frequency quadrupole accelerators for particle beams, are very impressive. In fact, much of the U.S. understanding as to how particle beams could be made into practical defensive weapons is based on Soviet work conducted in the late 1960s and early 1970s.

Radio Frequency Weapons

The USSR has conducted research in the use of strong radio frequency signals that have the potential to interfere with or destroy critical electronic components of ballistic missile warheads. The Soviets could test a ground-based radio frequency weapon capable of damaging satellites in the 1990s.

Kinetic Energy Weapons

The Soviets also have a variety of research programs underway in the area of kinetic en-

ergy weapons, using the high-speed collision of a small mass with the target as the kill mechanism. In the 1960s, the USSR developed an experimental "gun" that could shoot streams of particles of a heavy metal such as tungsten or molybdenum at speeds of nearly 25 kilometers per second in air and over 60 kilometers per second in a vacuum.

Long-range, space-based kinetic-energy systems for defense against ballistic missiles probably could not be developed until the mid-1990s or even later. The USSR could, however, deploy in the near-term a short-range, space-based system useful for satellite or space station defense or for close-in attack by a maneuvering satellite. Soviet capabilities in guidance and control systems probably are adequate for effective kinetic energy weapons for use against some objects in space.

Computer and Sensor Technology

Advanced weapons programs — including potential advanced defenses against ballistic missiles — are also dependent on remote sensor and computer technologies which are currently more highly developed in the West than in the Soviet Union. The Soviets are therefore devoting considerable resources to improving their abilities and expertise in these technologies. An important part of that effort involves an increasing exploitation of open and clandestine access to Western technology. For example, the Soviets have long been engaged in a well-funded effort to purchase U.S. high-technology computers, test and calibration equipment, and sensors illegally through third parties.

Antisatellite Developments

The USSR has had for more than a dozen years the world's only operational antisatellite system, a co-orbital device which enters into the same orbit as its target satellite and, when it gets close enough, destroys the satellite by exploding a conventional warhead. In addition, the nuclear-armed GALOSH ABM interceptor deployed around Moscow may have ASAT capability, and Soviet ground-based lasers could possibly damage some sensors on some U.S. satellites.

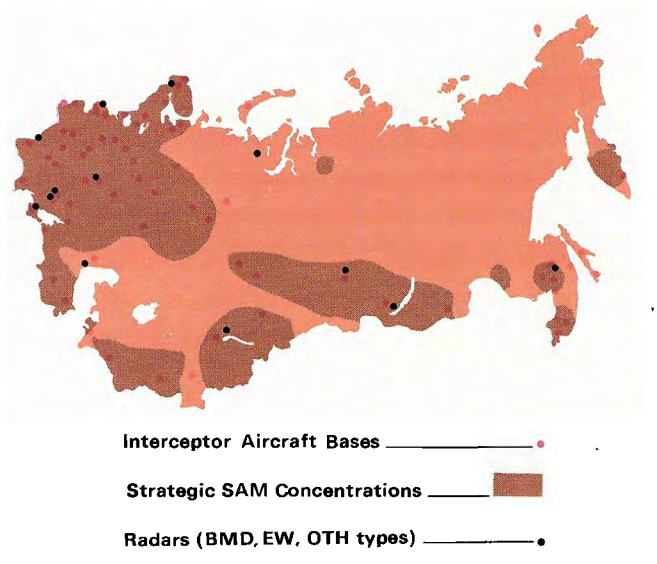
Furthermore, as noted earlier, the Soviets are engaged in research and, in some cases development, of weapons which ultimately may serve as ballistic missile defense systems, but probably will first provide antisatellite capabilities.

Air Defense

Although the United States began dismantling most of its defenses against Soviet bombers in the 1960s, the Soviet Union has continued to invest enormous resources in a wide array of strategic air defense weapon systems. Taken together, the Soviet strategic air defense network is a potent and increasingly capable force which would attempt to limit the retaliatory capability of our strategic bombers and cruise missiles.

The Soviets have deployed numerous strategic air defense systems with excellent capabilities against aircraft flying at medium and high altitudes. They are now in the midst of a major program to improve their capabilities against aircraft and cruise missiles that fly at low altitudes. That effort includes partial integration of strategic and tactical air defenses, the upgrading of early warning and surveillance capabilities, the deployment of more efficient data transmission systems, and the development and initial deployment of new aircraft, associated air-to-air missiles, surface-to-air missiles, and airborne warning and control system (AWACS) aircraft.

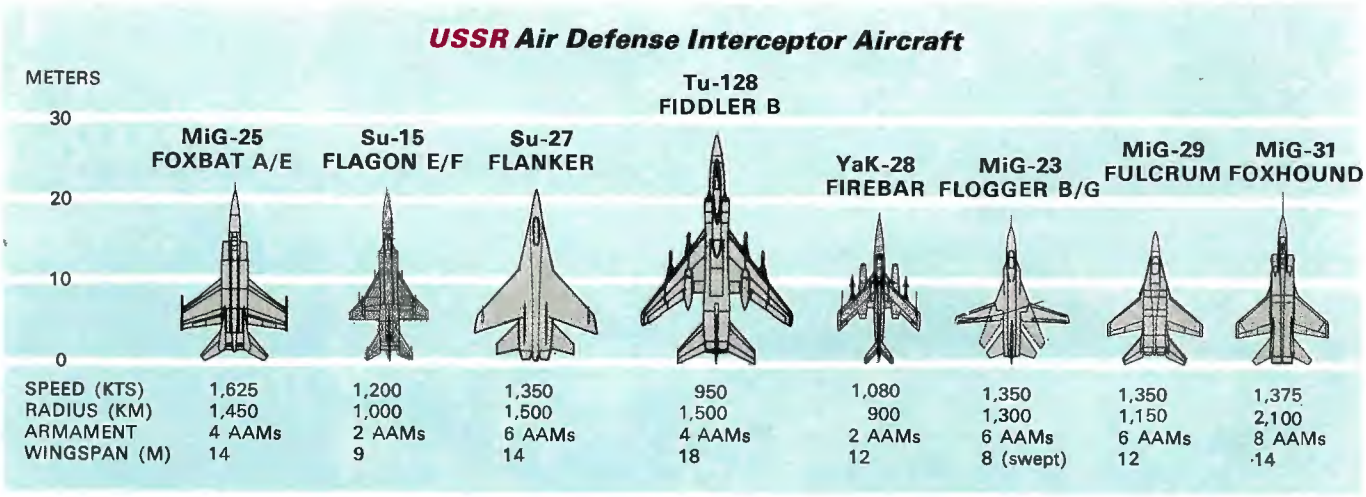
Soviet Territorial Air Defense

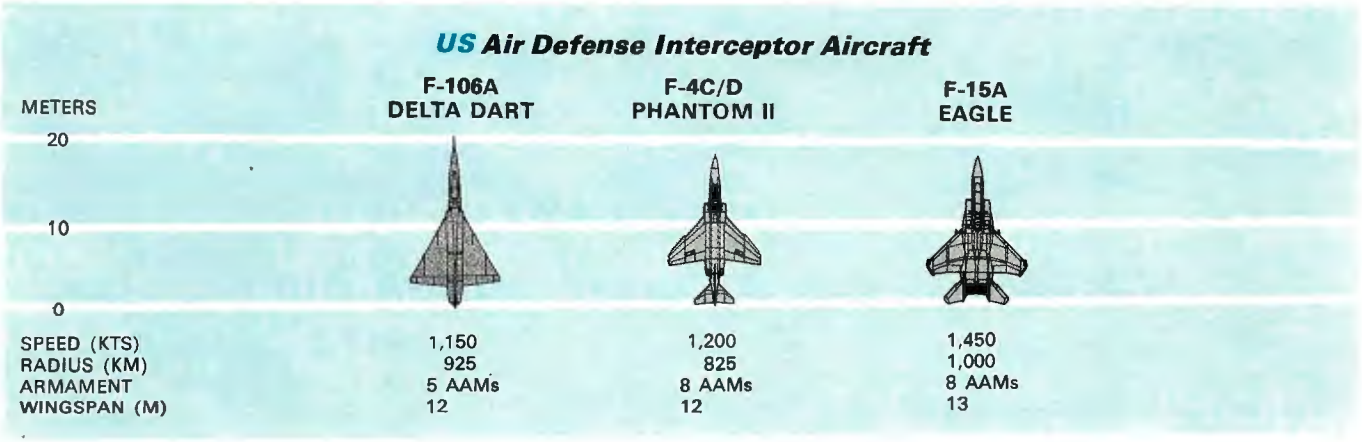


Currently, the Soviets have nearly 12,000 SAM launchers at over 1,200 sites, 10,000 air defense radars, and more than 1,200 interceptor aircraft dedicated to strategic defense. An additional 2,800 interceptors assigned to Soviet Air Forces (SAF) could also be employed in strategic defense missions. In contrast, the U.S. has approximately 300 interceptor aircraft based in the U.S. dedicated to strategic defense, 118 strategic air defense warning radars, and no operational strategic surface-to-air missile launchers. These figures do not include tactical air defenses deployed by NATO and the Warsaw Pact in Europe.

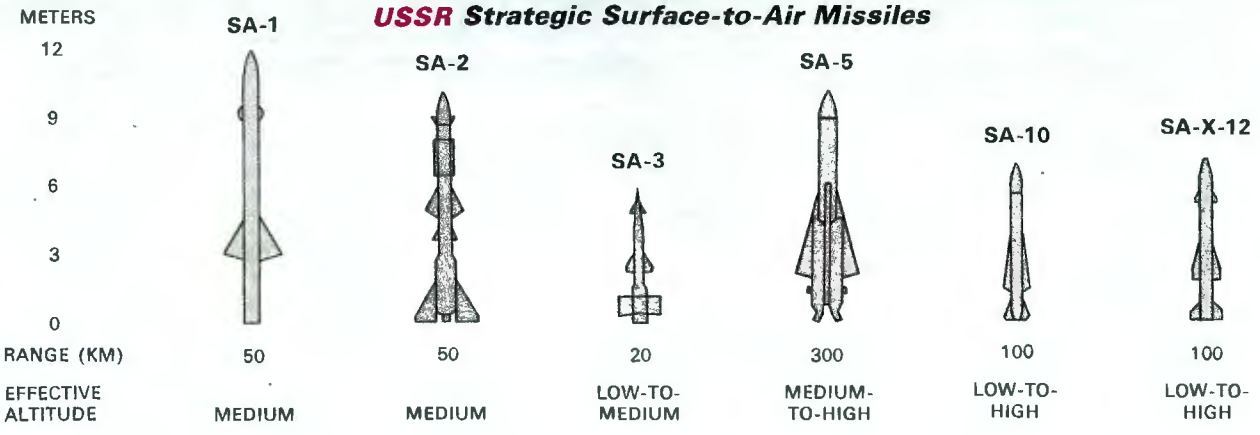
The new Il-76/MAINSTAY aircraft is illustrated as configured for its Airborne Warning and Control Systems mission.

The newest Soviet air defense interceptor aircraft, the MiG-31/FOXHOUND, has a look-down/shoot-down and multiple-target engagement capability. More than 85 FOXHOUNDS are now operationally deployed at several locations from the Arkhangelsk area in the northwestern USSR to the Far East Military District. Two new fighter interceptors, the Su-27/FLANKER and the MiG-29/FULCRUM, also have look-down/shoot-down capabilities and are designed to be highly maneuverable





The MiG-29/FULCRUM all-weather, air superiority fighter-interceptor reflects the USSR's continuing drive to produce new generations of tactical and strategic aircraft. The FULCRUM is fitted with AA-10 missiles and the USSR's most modern look-down-shoot-down radar.



in air-to-air combat. These three aircraft are equipped with two new air-to-air missiles — the long-range AA-9 (for the FOXHOUND) and the medium-range AA-10 (for the FULCRUM and FLANKER) — that can be used against low-flying targets.

The USSR is also deploying the MAINSTAY airborne warning and control system (AWACS) aircraft, which will improve substantially its capabilities for early warning and air combat command and control, especially against low-flying aircraft and cruise missiles.

The Soviets maintain the world's most extensive early warning system for air defense, composed of a widespread network of ground-based radars linked operationally with those of their Warsaw Pact allies. As previously noted, more than 10,000 air surveillance radars of various types provide virtually complete coverage at medium to high altitudes over the USSR, and in some areas well beyond the Soviet Union's borders. Three over-the-horizon radars for ballistic missile warning could provide additional warning of the approach of high-flying aircraft.

The USSR also has an active research and development program to improve its air surveillance network. In 1983, it began to deploy two new types of air surveillance radars which will enhance Soviet capabilities for air defense, electronic warfare and early warning of cruise missile and bomber attacks. The Soviets are also continuing to deploy improved air surveillance data systems that can rapidly pass data from outlying radars through the air surveillance network to ground-controlled intercept sites and SAM command posts.

Soviet strategic surface-to-air missiles provide low-to-high-altitude barrier, area, and terminal defenses under all weather conditions. Five systems are now operational: the SA-1, SA-2, and SA-3, and the more capable SA-5 and SA-10. The recent Soviet air defense reorganization permits efficient integration of strategic and tactical SAM systems. While most tactical SAMs have a shorter range than their strategic counterparts, many have better capabilities against targets flying at low altitude.

Over the years the Soviets have continued to deploy the long-range SA-5 and have repeatedly modified the system. Further deployment

The mobile version of the SA-10 SAM will soon be operational.

The surface-to-air missiles of the SA-X-12 air defense system are designed to counter high-performance aircraft, will also have a capability against tactical ballistic missiles, and may have a potential against some strategic ballistic missiles as well.

and upgrading of the SA-5 to enhance its capability to work in conjunction with low-altitude systems like the SA-10 are probable.

The SA-10 can defend against low-altitude targets with small radar cross-sections, like cruise missiles. The first SA-10 site was operational in 1980. Over 60 sites are now operational and work is progressing on at least another 30. More than half these sites are located near Moscow; this emphasis on Moscow and the patterns noted for the other SA-10 sites suggest a first priority on terminal defense of command and control, military, and key industrial complexes.

In keeping with their drive toward mobility as a means of weapons survival, the Soviets are developing a mobile version of the SA-10 which could become operational late this year. This mobile version could be used to support Soviet theater forces and to permit periodic changes in the location of SA-10 sites within the USSR so as to counter U.S. retaliatory forces more effectively.

The Soviets are also flight-testing another important mobile SAM system, the SA-X-12, which is able to intercept aircraft at all altitudes, cruise missiles, and short-range ballistic missiles. The SA-10 and SA-X-12 may have the potential to intercept some types of strategic ballistic missiles as well. This is a serious development because these systems are expected to be deployed widely through-

out the Soviet Union in the 1980s. They could, if properly supported, add a significant point-target defense coverage to a nationwide Soviet ABM deployment.

Passive Defenses

Soviet military doctrine calls for passive defenses to act in conjunction with active forces to ensure the wartime survival and continuity of Soviet nuclear forces, leadership, military command and control units, war-related industrial production and services, the essential work force, and as much of the general population as possible. The U.S. passive defense effort is far smaller and more limited; it is no way comparable to the comprehensive Soviet program.

Physical hardening of military assets to make them more resistant to attack is an important passive defense technique. The USSR has hardened its ICBM silos, launch facilities, and key command and control centers to an unprecedented degree. Much of today's U.S. retaliatory force would be ineffective against those hardened targets. To maintain effective deterrence, the United States must be able credibly to threaten prompt retaliation against the full spectrum of Soviet targets, including those which have been greatly hardened.

Soviet leaders and managers at all levels of the government and Communist Party are provided hardened alternate command posts located well away from urban centers — in addition to many deep bunkers and blast shelters in Soviet cities. This comprehensive and redundant system, patterned after a similar system for the Soviet Armed Forces, provides hardened alternate facilities for more than 175,000 key party and government personnel throughout the USSR.

Elaborate plans have also been made for the full mobilization of the national economy in support of a war effort. Reserves of vital materials are maintained, many in hardened underground structures. Redundant industrial facilities are in active production. Industrial and other economic facilities have been equipped with blast shelters for the work force, and detailed procedures have been developed for the relocation of selected plants and equipment. By planning for the survival of the essential work force, the Soviets hope to reconstitute vital production programs using those industrial components that could be redirected or salvaged after an attack.

In addition, the USSR has greatly emphasized mobility as a means of enhancing the survivability of military assets. The SS-20 and SS-25, for example, are mobile. Rail-mobile deployment of the SS-X-24 is expected before the end of the decade. The Soviets are also developing an extensive network of mobile command, control, and communications facilities.

Soviet Statements on the U.S. Strategic Defense Initiative

These extensive Soviet activities in strategic defense, combined with the large Soviet buildup in offensive forces over the past two decades, have been eroding the retaliatory capabilities of U.S. strategic forces on which deterrence has long rested. If the USSR in the future were unilaterally to add an effective advanced defense against ballistic missiles to its offensive and other defensive forces, it would pose a very serious new threat to U.S. and allied security.

The U.S. Strategic Defense Initiative is designed to counter the trend in the Soviets' favor. It is thus not unexpected that Soviet reactions to the U.S. Strategic Defense Initiative have been strongly negative. Through an intensive, worldwide propaganda campaign, the USSR evidently hopes that it can dissuade the United States from pursuing this research program, thereby preserving the possibility of a Soviet monopoly in effective defenses against ballistic missiles — a monopoly that could give the USSR the uncontested damage-limiting first-strike capability that it has long sought.

Thus, Soviet statements on the SDI must be seen in light of the extensive, long-term growth in Soviet offensive and defensive forces and of their major research effort to develop advanced weapons for defense against ballistic missiles. They should also be viewed in light of comparable Soviet propaganda campaigns on other issues. The USSR engaged in a major propaganda effort in the late 1970s and early 1980s to preserve its monopoly in longer-range intermediate-range nuclear forces, and has adopted many of the same tactics to prevent the United States from acquiring an operational ASAT system to balance its own.

On April 22, 1983, a month after the President's announcement of the Strategic Defense Initiative, a published letter signed by more than 200 senior Soviet scientists denouncing the initiative appeared in the New York Times. It is interesting and instructive to note that a number of the signatories have been instrumental in the development of both traditional and advanced ballistic missile defensive systems: Petr D. Grushin, Vladimir S. Semenikhin, Fedor V. Bunkin, Yevgeniy P. Velikhov, Vsevolod S. Avduyevskiy, Aleksandr M. Prokhorov, and Nikolay G. Basov. Velikhov, for example, was for several years the director of the Institute of Atomic Energy laboratories at Troitsk,

Dr. Y.P. Velikhov has been a central figure in the development of the USSR's high energy laser weapons. As Chairman of the committee of Soviet Scientists in Defense of Peace and Against Nuclear War, Dr. Velikhov is also the leading Soviet scientific spokesman against the U.S. Strategic Defense Initiative.

where lasers for strategic and tactical applications are being developed. Avduyevskiy has long been involved with strategic weapons research and now has responsibility for a number of projects concerned with the military use of space, including a space-based laser weapon. Other signatories have spent their careers developing strategic offensive weapons and other military systems: Vladimir N. Chelomey, Valentin P. Glushko, Aleksandr D. Nadiradze, and Viktor P. Makeyev in ICBMs and SLBMs; Oleg K. Antonov and Aleksandr S. Yakovlev in military aircraft; Nikolay Isanin in nuclear submarines; Yuliy B. Khariton in the Soviet military nuclear energy program; and Martin I. Kabachnik in chemical warfare.

The U.S. Strategic Defense Initiative

The U.S. Strategic Defense Initiative offers the possibility of a better, more stable deterrence based increasingly on defenses that are survivable, militarily effective, and cost-effective relative to offensive forces. If our research shows that such defenses against ballistic missiles are feasible, they would allow us to move from deterrence based solely on the threat of nuclear retaliation, toward enhanced deterrence characterized by greater reliance on defensive capabilities that threaten no one. The Strategic Defense Initiative is also a prudent and necessary response to the very active Soviet efforts in offensive and defensive forces. It responds directly to the ongoing and extensive Soviet anti-ballistic missile effort, including the existing Soviet deployments permitted under the ABM Treaty. The SDI research program provides a necessary and powerful deterrent to any near-term Soviet decision to expand rapidly its ABM capability beyond that contemplated by the ABM Treaty. It also provides insurance against an eventual Soviet attempt to deploy an effective advanced system for defense against ballistic missiles unilaterally.

SDI research complements our efforts to achieve significant, equitable, and verifiable reductions in nuclear forces. In the near term, we are seeking reductions of strategic and intermediate-range nuclear forces, and discussing defensive and space arms, in the U.S.-Soviet negotiations which opened in Geneva in March 1985. The United States and the Soviet Union have agreed that there is a fundamental relationship between offensive and defensive systems and that neither can be considered in isolation.

In the longer term, if we were to deploy advanced defenses against ballistic missiles, such defenses could increase significantly the incentives for further negotiated deep reductions in offensive nuclear forces because they could reduce or eliminate the military utility of ballistic missiles. Such significant reductions would, in turn, serve to increase the effectiveness of defensive systems.

The SDI research program emphasizes advanced non-nuclear defensive technologies. It will provide to a future President and Congress, possibly in the early 1990s, the technical knowledge required for a decision on whether

to develop and later deploy advanced defensive systems. Extensive discussions with our allies would take place prior to any future decision to move beyond research to development and deployment.

Any future deployment would also be a matter for discussion and negotiation as appropriate with the Soviet Union, as provided in the ABM Treaty. Even now we are seeking to engage the Soviets at Geneva in a discussion of the relationship of offensive and defensive forces and of a possible future transition to greater reliance on defensive systems.

While we could not allow a Soviet veto over a decision which would have such a major impact on U.S. and allied security, it is our intention and hope that — if new defensive technologies prove feasible — we and the Soviets would be able both to move to a more defense-reliant balance. What we envision is thus just the opposite of an arms race or a search for military superiority. We seek instead an approach that would serve the security interests of the United States, our allies, the Soviet Union, and the world as a whole.

Annex

Offensive Forces

Soviet military doctrine and strategy call for superior offensive forces capable of executing a successful first strike. The Soviet buildup in offensive forces over the last two decades has been designed to move in that direction.

Soviet strategic offensive forces introduced since 1971 include:

- four new types of intercontinental ballistic missiles (ICBMs) — the SS-17, 18, 19, and 25. In addition, the USSR probably has deployed the SS-16 in violation of the SALT II Treaty;
- five new types of ballistic missile-carrying submarines;
- four new types of submarine-launched ballistic missiles (SLBMs);
- five improved versions of existing SLBMs;
- long-range cruise missiles; and
- a new variant of the BEAR bomber carrying strategic air-launched cruise missiles.

That buildup is all the more striking when compared to the relative restraint exercised by the U.S. in its acquisition of nuclear weapons systems during the same period. The number of strategic and tactical nuclear warheads in the U.S. stockpile peaked in 1967. We had one-third more nuclear weapons then than we have now. Moreover, the total explosive power (measured in megatonnage) of our nuclear weapons was four times greater in 1960 than it is today.

Our latest B-52 bomber was built in 1962. Although we modernized the missiles our submarines carried with the POSEIDON C-3 in 1971 and TRIDENT I C-4 in 1979, we did not introduce a single new ballistic missile-carrying submarine from 1966 until 1981, when we began deploying the TRIDENT submarine at the rate of about one a year. In fact, our ballistic missile submarine force declined by one-fourth between 1966 and 1981, from 41 boats to 31. During the time we were decreasing the number of our SSBNs, the Soviet Union deployed 62 new ballistic missile-carrying submarines.

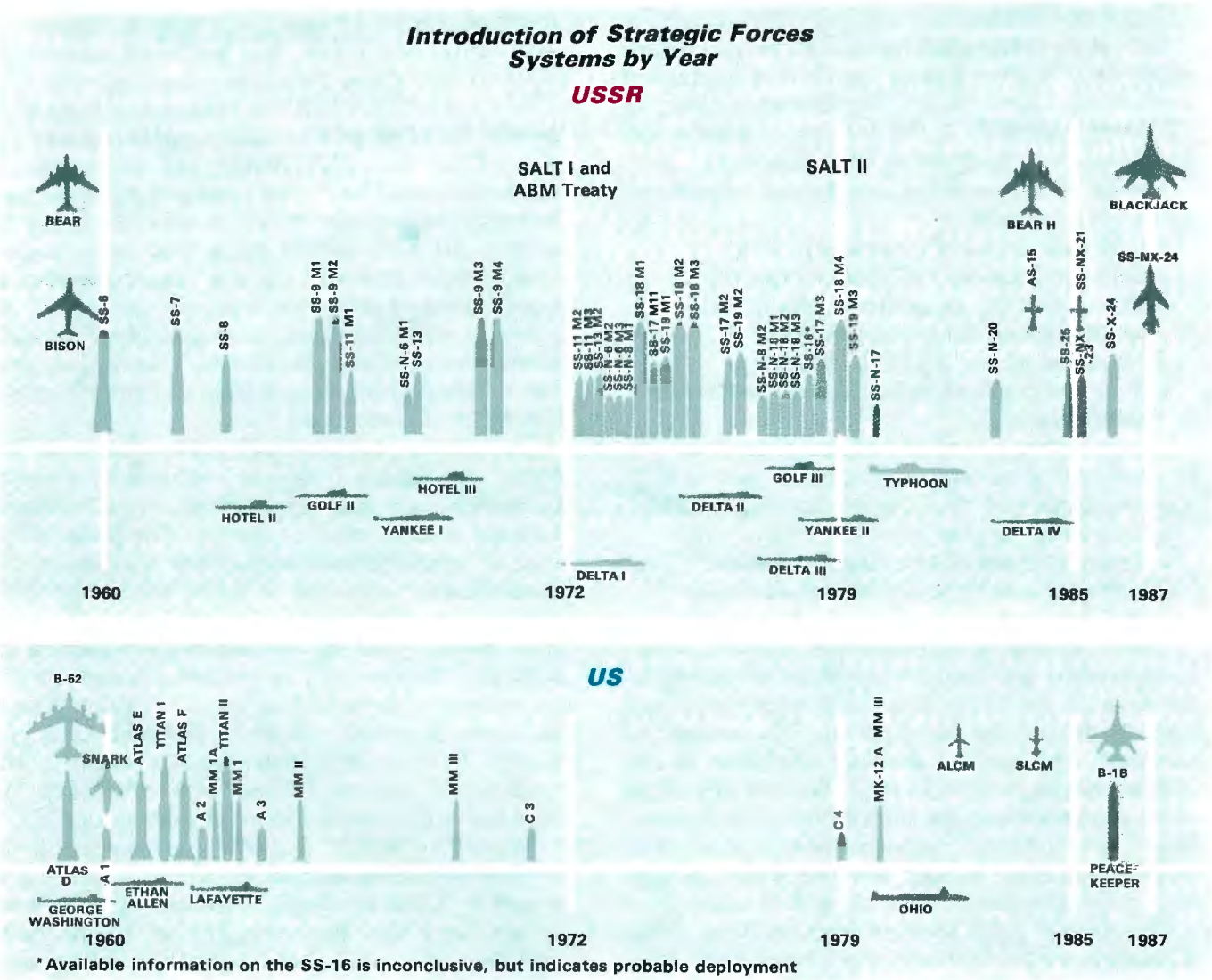
Similarly, the U.S. began deploying its newest ICBM, the MINUTEMAN III, fifteen years ago; today, we have fewer ICBMs than we did in 1967. By contrast, the Soviet Union has added about 800 ICBMs to its arsenal since that year. Of greatest concern for strategic stability has been the development and deployment of the SS-18 and SS-19 ICBMs. Since the late 1970s, the USSR has deployed more than 300 SS-18s, each twice as large as the U.S. PEACEKEEPER/MX and carrying ten warheads, and 360 SS-19s, each approximately the size of the PEACEKEEPER/MX and carrying six warheads. The Soviets already have enough hard-target-capable ICBM warheads today to attack all U.S. ICBM silos and launch control centers and will have a larger number of hard-target capable warheads in the future. (A weapon with hard-target capability has sufficient accuracy and yield to destroy targets that have been hardened to withstand the effects of a nuclear detonation.)

In addition to the rapid growth in its ICBM force, the Soviet Union is engaged in a major modernization and expansion of its strategic bomber and submarine forces. The bulk of Soviet strategic offensive nuclear warheads has traditionally been on ICBMs, while the U.S. has maintained a balanced force, with fewer than one-quarter of our strategic weapons on ICBMs. The growth in modern Soviet strategic offensive forces of all types is thus not only exacerbating the imbalance between U.S. and Soviet ICBMs, but also steadily eroding the traditional countervailing U.S. advantage in SLBMs and strategic bomber systems.

When the SALT I Interim Agreement on Offensive Arms was signed in 1972, the USSR had roughly 2,300 strategic ballistic missile warheads, and the throw-weight of its ballistic missile force was about 3 million kilograms. (Throw-weight is a basic measure of ballistic missile destructive capability and potential.) By the time the SALT II agreement was signed in 1979, the Soviet strategic arsenal had more than doubled to roughly 5,500 strategic ballistic missile warheads with a ballistic missile throw-weight of about 4 million kilograms. Today, the Soviet Union has over 8,000 strategic ballistic missile warheads and a ballistic missile throw-weight of about 12 million kilograms.

Perhaps even more troubling is the fact that the USSR's offensive nuclear force buildup continues unabated, with a large number of new systems at or nearing deployment. For example, the Soviets are:

- continuing production of the BEAR H bombers which carry the AS-15 long-range



*Available information on the SS-16 is inconclusive, but indicates probable deployment

air-launched cruise missile. They are also developing a new strategic bomber, the BLACKJACK, which, when deployed before the end of the decade, will be larger than either the U.S. B-1B or B-52;

- completing development of the SS-X-24 and have announced deployment of the SS-25 ICBM. The SS-25 violates the SALT II agreement, since it is a prohibited second new type of ICBM;
- deploying two new classes of nuclear-powered ballistic missile-carrying submarines (SSBNs), the DELTA IV and the TYPHOON, and associated SLBMs. They are also testing a new sea-launched cruise missile, the SS-NX-21.

The combination of U.S. restraint and Soviet expansion and modernization of its strategic offensive forces means that U.S. forces are becoming increasingly obsolete. We are therefore modernizing our strategic nuclear forces to ensure the balance necessary for continued deterrence. That program includes development of the PEACEKEEPER/MX ICBM, a smaller single-warhead ICBM (popularly known as MIDGETMAN), the B-1B bomber, an advanced technology bomber, and the TRIDENT II SLBM. We are also deploying long-range air- and sea-launched cruise missiles and TRIDENT SSBNs. Our strategic modernization program is essential not only for the military balance, but also to induce the Soviets to agree to nego-

tiated offensive force reductions which would enable us to maintain the balance at far lower levels of armaments.

The Soviet Union has also greatly expanded its nuclear forces of less-than-intercontinental range, which primarily threaten our friends and allies. The USSR has developed an entirely new generation of nuclear short-range ballistic missiles. Of gravest concern has been the creation and subsequent rapid expansion of the SS-20 longer-range intermediate-range missile force, which threatens our friends and allies in Europe and Asia. NATO had no equivalent systems when the USSR began to field this modern, mobile, highly accurate, triple-warhead missile. As of September 1985, the Soviets had deployed 441 SS-20s, with over 1,200 warheads. Not only is the SS-20 force continuing to grow, but the Soviets are also testing a modified version of the SS-20 which is expected to be even more accurate. In contrast, NATO plans to deploy 572 single-warhead PERSHING II and ground-launched cruise missiles and stands ready to reduce or reverse those deployments if we can reach an equitable, verifiable arms reduction agreement with the USSR.

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release July 12, 1986

RADIO ADDRESS
BY THE PRESIDENT
TO THE NATION

Camp David

12:06 P.M. EDT

THE PRESIDENT: My fellow Americans, one week ago 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 at 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 see 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 1970's, the Soviet Union has been racing forward in a vast and continuing military build-up, 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 U.S.

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 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.

MORE

All this makes it ever more important to keep our strategic defense research moving forward. We have set up a well-managed program which, in just over 3 years, has already accomplished much. Even faster progress than expected has been made in developing the system's "eyes" -- scientists call them sensors, and its "brains" -- which guide an interceptor toward its target, and methods of stopping incoming missiles, especially with non-nuclear means. Technological advances now permit us to detect and 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 am sorry to say, however, that some members of Congress would take a short-sighted course, deeply cutting the funds needed to carry out this vital program. So it is 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.

END 12:11 P.M. EDT

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release July 18, 1986

REMARKS BY THE PRESIDENT
TO AMERICAN LEGION AUXILIARY'S GIRLS NATION

The Rose Garden

1:03 P.M. EDT

THE PRESIDENT: Well, please be seated. It's wonderful to be here today and I want to thank all of you for coming by and a special hello to Director Corky Bradshaw. Congratulations to your newly-elected President, Cherie Harder and Vice President, Katherine Mooney. It does my heart good to see all of these smiling faces of yours out here, but it's especially good to know that you're in Washington this week to study and participate in the democratic process.

You know, part of a President's job is to prepare our nation for the future -- for the years and even the decades ahead -- and lately I've been making a point of speaking to those to whom our future belongs, young Americans like yourselves. This spring, I spoke to a group of high school students here in the Rose Garden. The weather was a little more comfortable than this. And then last month, I went up to Glassboro, New Jersey to speak at a high school commencement. And both times I shared thoughts similar to those I'd like to discuss with you today -- my hopes for world peace and freedom, my conviction that Americans of your generation have every reason to look to our country's future with confidence and self-assurance.

The challenges America must face in the world -- the challenges that you must face as you become America's leaders -- are twofold. I'm confident you'll achieve both of them. The first is expanding the boundaries of democracy and freedom by curbing in the face of totalitarian expansion that urge on the part of some governments to seek domination of even more territory and peoples. And the second is new to my generation but something you've already lived with all your lives, the threat of nuclear war. So, as I said some years ago in an address to the British Parliament, we have before us these two tasks: promoting the cause of freedom and keeping the peace by avoiding the kind of war that could obliterate civilization itself.

In both efforts, diplomacy, of course, is important. And that's why in our arms control negotiations we've been pressing for real reductions in strategic nuclear weapons. But something else is also important -- call it readiness; call it deterrence; call it the common sense that knows we must use all our resources, including our creative and technological genius, to remain strong and free.

You may remember from your history books how, back in the 1930's when the threat of World War II was growing, statesmen like Winston Churchill called for rebuilding the defenses of democratic nations, and for research that would develop new defenses. We know today that some of these inventions like radar did, in the end, enable the democracies to help defend themselves. Yet history might well have been different if only the democracies had developed these defenses earlier and by making technological breakthroughs established the kind of deterrence that could have prevented a world war.

I know there's a lot of debate today about defense budgets and about whether we should be maintaining our strength. There had been four wars in my lifetime. Not one of them started

because this country was too strong. Mainly they started because others thought we wouldn't defend our rights or our freedom.

We don't intend to make the same mistake -- and this means performing research to develop new options. Today, if a foreign country were to launch a nuclear attack on America, a President would be forced to respond in kind. But the research program we've begun could produce the means to destroy the incoming nuclear weapons before they reached our country and without launching a counterattack of our own, thereby saving millions of lives in our own nation and in other nations. In other words, our research could produce a system that would destroy missiles instead of people. We call it the Strategic Defense Initiative or, as you see it all the time referred to as SDI. Washington's just crazy about giving everything initials.

This initiative would have the further benefit that it would limit the possible destruction done by accidental war or war caused by the act of a single terrorist or madman. And in foreign relations, SDI has already proven a boon -- indeed, the very fact that we're pushing forward with SDI has helped speed up the arms reduction process. SDI is not a bargaining chip in this process, but its existence may have helped to persuade the Soviet Union that constantly adding to their arsenal of offensive nuclear weapons will no longer give them a corresponding military advantage. In simple language, our SDI research will help take the profit out of the Soviet buildup in offensive arms.

The Strategic Defense Initiative represents in short an instrument of hope -- hope that we can build a better world, and hope that you young Americans need never know the horror of war; hope that, in peace, we can expand human freedom until it encircles the globe.

This hope of human freedom is something we Americans thought about a lot over the Fourth of July. And I suspect that you're learning this week what I mentioned in New York harbor: here in America, we have inherited a precious legacy -- the freedom to govern ourselves. And let me just take a moment here to speak on a special project that deserves all of our support. The most powerful tool that you and I have with which to preserve our liberties and shape our own futures is our right to vote. Yet, tragically, in every election, millions of Americans fail to exercise this special privilege -- and worse, of those not voting, the highest percentage is among our young people ages 18 to 24.

We ought to think very hard about the number of countries in the world who have fought for that privilege and how, today, 85 -- 90 percent of their people turn out in election. And here, where we have fought and so many have given their lives for that right to vote, we run a little over 50 percent of our people -- almost half our people regularly just don't bother to go and vote.

And that's why I would like to take a moment now to thank the men and women who, through another national, non-partisan project, one called Vote America, are working in their own communities to encourage more citizens, especially our youth, to register and to vote. And in keeping with the same spirit of participation and commitment that has restored the Statue of Liberty, I want to ask each of you to take part in this national effort by urging your friends and family to vote in this -- because this is an election year -- and every election. And through our votes, each of us can make a mark on this great nation of ours. After all, America's freedom, in fact our very future, depends on America's voters.

Maybe you've heard your folks speak of a one-time entertainer, kind of a cowboy philosopher at the same time that he was a great entertainer, Will Rogers. And Will Rogers once observed -- he said, "You know, the people you send to public office are no

better and no worse than anyone else. But they're all better than the people that don't vote at all." Made a lot of sense in his way.

Furthering democracy really is at the heart of what America's all about -- the conviction that we as a people can never truly rest until every man, woman, and child on earth knows the blessings of liberty.

Ray Charles -- you've heard him -- the great blind singer, pianist -- he explains -- well, you've heard him, I know. He loves to sing, "America, The Beautiful." And this explains his feelings about our country this way -- he said, "You've got people who would give up their lives trying to get here. I know of no place in the world where people do that. I don't know of any country in the world that's as glorious as ours. When you match America against anyplace, it is still the heaven of the world, by far." (Applause.)

So in practicing democracy, please always bear in mind the blessing that is America; just as, I assure you, those of us who are older bear in mind our own blessing in having young people such as yourselves, young people who love their country and are committed to the cause of freedom.

One other thing, many people made great sacrifices so that all of us could live in freedom; and no group sacrificed more dramatically than the members of the American Legion and the Legion Auxiliary. It's a funny thing -- some people don't know how to stop giving; they just keep going on; that's why Girls Nation and Boys Nation, which will be here next week, and all the other great things the American Legion does exist today.

So when you get back home, do me a favor: tell the Legionnaires and their ladies that the Gipper was asking about them and said thanks. (Applause.)

And I think it's high time I let you get in out of this hot sun. And thank you all for being here and for what you're doing. God bless you all. (Applause.) Thank you.

END 1:12 P.M. EDT

L. Kojelis

NATIONAL SECURITY COUNCIL
WASHINGTON, D.C. 20506

1368

February 20, 1986

ACTION

MEMORANDUM FOR RODNEY B. MCDANIEL

FROM: STEVEN E. STEINER Steve

SUBJECT: Presidential Videotape on SDI

At Tab I for your signature is a joint NSC/OPL memo to Ryan asking that the President make a five-minute videotape for the SDI anniversary dinner being hosted by the Coalition for SDI. Since the Coalition encompasses a large number of influential private sector organizations, this is an excellent way to get across a basic Presidential message on SDI--one designed in part to express appreciation for and give a spur to private efforts to promote the President's program.

We view this as one of several actions which will help to commemorate the third anniversary of the President's March 23, 1983 address. The centerpiece should be a Presidential address to the gathering of the SDI research community on March 18, which is being hosted by the American Defense Preparedness Association. We sent you a separate scheduling proposal on this, packet number 1045, and would appreciate your efforts to obtain prompt approval from the Schedulers.

RECOMMENDATION

That you sign and transmit the memo to Ryan at Tab I.

Approve _____ Disapprove _____

YES Bob Linhard, Ron Sable and Johnathan Miller concur.

Attachment

Tab I Memo to Ryan

Mona —
Pls pass this file on to Max.
— L

THE WHITE HOUSE

WASHINGTON

1368

February 20, 1986

SCHEDULE PROPOSAL

TO: FREDERICK J. RYAN, DIRECTOR, PRESIDENTIAL APPOINTMENTS AND SCHEDULING

FROM: LINAS KOJELIS/~~S~~PECIAL ASSISTANT TO THE PRESIDENT AND ACTING DIRECTOR OF PUBLIC LIAISON
RODNEY MCDANIEL, EXECUTIVE SECRETARY, NATIONAL SECURITY COUNCIL

REQUEST: President to make a five-minute videotape to be played at Coalition for SDI dinner

PURPOSE: The Coalition for SDI (CSDI) is an outgrowth of General Daniel Graham's High Frontier but has since expanded enormously. It now consists of over 170 member organizations including religious, public policy, ethnic, defense, and other groups, both in America and in Japan and Europe.

CSDI's invitation to the President to attend the dinner, which is scheduled to coincide with the third anniversary of the President's initial SDI speech, was regretted. Secretary Weinberger will deliver the main address.

Eighty-two bi-partisan members of Congress are also members with Jack Kemp and Jim Courter serving as Republican co-chairmen in the House and Earl Hutto and Bill Chappell serving as Democratic co-chairmen. In the Senate, Malcolm Wallop and Ernest Hollings serve as co-chairmen.

They produced the 30-second T.V. commercial on the "Peace Shield" which was aired around the country before the Geneva Summit. They also published print advertisements in USA Today and The Washington Times.

DATE: Tape should be ready by March 17, 1986.

OUTLINE OF EVENT: A five-minute prepared speech on SDI, videotaped at the White House.

REMARKS REQUIRED: Videotape

MEDIA COVERAGE: None

RECOMMENDED BY: OPL, NSC

PROJECT OFFICER: Mona Charen, x2310

NATIONAL JEWISH COALITION

Max M. Fisher
Honorary Chairman
Richard J. Fox
National Chairman
George Klein
Gordon Zacks
Co-chairmen
Ivan Boesky
Finance Chairman

Chris Gersten
Executive Director
Howard Kohr
Deputy Director

5701

June 26, 1986

Mr. Max Green
Associate Director
Office of Public Liaison
OEOB Room 196
Washington, D.C. 20500

Dear Max:

As you are aware, the National Jewish Coalition has taken the initiative in the Jewish community toward promoting the Strategic Defense Initiative. We have published numerous Op Ed pieces in both the Jewish and secular press and have communicated with Congress the importance of the President's program.

We would appreciate it if you would keep us in mind regarding future White House Briefings and events concerning SDI. Charles Brooks, the Outreach Director and Defense Analyst for the Coalition, has been coordinating NJC efforts on this issue and will represent us a SDI support events.

I will keep in touch.

Best Regards,

Chris

Encls.

C.C. Linas Kojelis

(202) 547-7701
415 SECOND STREET, N.E.
SUITE 100
WASHINGTON, DC 20002

SHORTER RANGE BALLISTIC MISSILE THREAT AND DEFENSES AGAINST IT

Prepared for the Senate Armed Services Committee
by
The Office of Senator Dan Quayle

Abrahamson, James and Gallois, Pierre. "Space-Based Defense: The View from the Top," Geopolitique, Spring 1985, pp. 5-28.

Anti-Tactical Ballistic Missile Study, System Planning Corporation, Arlington, VA, Contract MDA903-81-C-0565, DCSOPS, May 1982.

Anti-Tactical Ballistic Missile (ATBM) Study: Target Acquisition of Warsaw Pact Tactical Missile Systems, System Planning Corporation, Arlington, VA, Contract MDA903-83-C-0224, August 1984.

Blair, David and Chow, Brian. Deterring Attacks With Ballistic Missile Defenses: Cost Effectiveness, Arms Race Stability, and Crisis Stability, Briefing for the New Alternatives Workshop, San Francisco, California, June 1985.

Brooks, Charles D. "America, Israel and SDI," American-Jewish Life, 29 November 1985, p. 10.

Canavan, Gregory. "Theater Applications of Strategic Defense Concepts," Los Alamos National Laboratory, LA-UR-85-2117, June 1985.

Carus, Seith W. "Surface-to-Surface Missiles and Artillery" in The Threat to Israel's Air Bases (Washington, D.C.: AIPAC Papers, 1985), pp. 21-23.

Carus, Seth W. "The Threat to Israel from Tactical Ballistic Missiles." testimony before the Senate Subcommittee on Stategic and Theater Nuclear Froces, 30 January 1986.

Cheek, F., Mooring, T., and Goidel, J. ATM Literature Review, Science Application, Inc., Huntsville, AL, SAI-83/2071 &HH 06.38-84 (104), Contract DASG60-81-C-0032, P00008, 28 June 1984.

Clark, George, "Anti-Ballistic Missile Defense of NATO," paper prepared for Congressman Duncan Hunter 1 November 1985.

Cordesman, Anthony. "Theater Implications of the SDI: A Conceptual Analysis," prepared for Los Alamos National Laboratory, 4 September 1984.

8/1/86

REVIEW & OUTLOOK

SDI: Death of 1,000 Cuts

President Reagan's latest arms-control letter to Chairman Gorbachev means that his strategic defense initiative is now on the table. Whether or not anything comes of this, it was a clear defeat for the Pentagon and other SDI proponents. They set themselves up insisting that nothing worthwhile can be deployed anytime soon.

The letter proposes that the U.S. agree not to deploy SDI for five to seven years, that the Soviets make deep cuts in offensive weapons and that the sides agree that defensive deployments are allowed after the seven years. In some sense, we suppose, this can be read as putting a time limit on our adherence to the ABM treaty limiting defensive deployments. Now, the Russians' only interest in this lies in stopping our technology, and they are not about to change their spots. By now skepticism about their treaty violations is pervasive both in the administration and in the Senate that would have to ratify any agreement. Any official treaty remains remote.

The danger is far more insidious. Our experience has been that, treaty or no, a U.S. negotiating position becomes the planning document for defense research and procurement. If the official line is that SDI eventually will be negotiated away, why should ambitious young officers and scientists hitch their careers to it, or military chieftains devote their budgetary resources to it, or Congress fund it, or even its proponents go to the mat? This kind of death-by-a-thousand-cuts has repeatedly gutted promising weapons systems. Indeed, it is the principal leverage the arms-control process gives the Soviets in curtailing our defense programs.

In its advocacy of SDI, the Reagan administration did not walk but ran into this trap. Its position has been that SDI is only a research program, and will remain only a research program until it solves the problem of building a defense against the possibility that the Soviets might launch their entire missile force against women and children, ignoring military assets that might strike back. We would not deploy anything, the line goes, until our research finds a way to stop every last missile in such an insane contingency.

By taking this preposterous position in the intramural boxing, the pro-SDI forces led with their chins. The pro-arms-control forces have replied: Well, if we're not going to deploy anyway, anything we get out of agreeing not to deploy comes for free. If the Soviets junk some obsolete missiles they were going to junk anyway, we still haven't lost anything. The Soviets are clever enough to frame offers encouraging this line of reasoning, SDI goes on the table and the death-of-a-thousand-cuts begins.

Now, the reason pro-SDI forces have opposed near-term deployment is not entirely foolish. The easiest technical problem is defending the silos for retaliatory missiles. For our part, we would defend the silos today, tomorrow or back when the ABM treaty was negotiated in 1972. It's far cheaper than any of the cockeyed schemes for basing new MX missiles. Doubtless, though, a silo defense—if you stop with that—is anything but a step away from the policy of mutual assured destruction. And if the silos were safe, still-powerful proponents of MAD would even more strenuously argue against defending cities.

Solidifying MAD is not at all what the administration wants from SDI. Even if a silo defense succeeded against an actual attack, a U.S. president would be left with the sole option of launching a strike to kill Soviet women and children. The driving force behind SDI is the desire to give a president more moral and more usable options; this requires a plausible degree of population defense. The Pentagon leadership has opposed any limited system for fear of getting left with only a silo defense.

In fact, quite a few things can be done in the near term that would be highly useful. The technologies now being discussed have large "footprints," and even if centered on missile fields could protect large sections of the country—at the very least against accidental, third-party or demonstration attacks. Even against a significant attack the defense of the national command authority looks both quite possible and vitally important. Perhaps easiest of all, we could start to deploy a defense against tactical ballistic missiles in Europe. These are easier to intercept because they travel slower than their intercontinental counterparts.

The Pentagon's own Hoffman panel took the common-sense position that while a leak-proof defense is far away, you have to learn to walk before you learn to run. It concluded that the place to start is an anti-tactical ballistic missile (ATBM). The German, British and Israeli defense ministries have expressed an interest in cooperating on the project. Sen. Dan Quayle recently won approval in the Senate Armed Services Committee of an amendment to set aside $50 million of the SDI budget for ATBM research and development, with matching funds to be provided by allies.

We certainly think the administration has the right goal in population defense, but it will never get there by waiting for a leak-proof system that can be deployed overnight. We'd also like to believe the president's letter didn't sentence SDI to the death-of-a-thousand-cuts. But to insure the momentum of the technological drive, the administration now needs to get going with the steps it can take sooner rather than later.

Thank you for the copies of the tapes you sent to the President. I enjoyed listening to the interviews + and learning more about what the C—— is doing. I like being informed about what you do.

Yours and your organization have done much to further the President's cause. You have help us in educating people to learn and I commend you on your achievements.

Thank you again for the tapes and for all your efforts. Keep up the good work.

Best
Sincerely —

The New York Times Magazine · AUGUST 24, 1986

SDI

10

THE STAR WARS SPINOFF

The controversial defense system is yielding technologies that seem sure to change the world.

By Malcolm W. Browne

THE LANDSCAPED INDUSTRIAL park that flanks San Diego's Balboa Avenue hints of well-appointed board rooms, robotic assembly lines and healthy workers bronzed by weekends on the nearby beaches. The street is only a few minutes' drive from Sea World and other tourist magnets, and to the casual visitor it seems as far removed as an American suburb could be from any hint of war or weaponry. But the peaceful mien of the neighborhood is disturbed several times a week by the blast of a stunningly powerful cannon that sends flocks of startled birds into the air and sets off burglar alarms in parked cars over a wide area.

The source of the noise is one of the world's first rail guns, a new breed of electromagnetic artillery potentially capable of piercing the most heavily armored tanks, of picking off intercontinental missiles and battle satellites, and even of hurling projectiles to distant planets.

The rail gun, built by Maxwell Laboratories Inc., and named Checmate (an acronym for Compact High Energy Capacitor Module Advanced Technology Experiment), is about the size of a large merry-go-round and stands in a hangarlike building. One recent morning, flashing red lights and insistent loudspeakers warned nonessential personnel away while technicians sealed off the test building and retreated to the safety of a control shack. As the countdown progressed, pictures and computer data flowed across monitor screens, and workers readied the lasers, X-ray flash cameras and diagnostic sensors used for assessing each shot. The whine of high-power electrical equipment rose to a scream, a supervisor nodded to a controller, and the rail gun fired, sending a shudder through the factory compound, slapping clothing against the legs of passers-by and leaving ears ringing.

Hastily donning gas masks, technicians swarmed into the smoke-filled rail-gun building to look for equipment damage and check the target. Incredibly, a metal projectile scarcely larger than a household nail had been driven into a sandwich of thick steel plates to a depth of several inches. "Nice clean shot," someone observed. "We're moving right along."

In fact, experts say, American efforts to develop an electromagnetic rail-gun launcher — a gadget conceived by weapons makers as long ago as World War I — have achieved in the last two years alone what Defense Department planners had once predicted would take a decade. And credit for the project's impressive progress goes to what may be the most costly and intensive military research program in history: the Strategic Defense Initiative. Together with hundreds of other arcane, high-technology devices, ideas and systems, the rail gun has been selected for grooming and development as part of President Reagan's controversial vision of a defense shield capable of defending the United States against a Soviet ballistic-missile attack.

The merits of the President's plan — promptly dubbed "Star Wars" by advocates and opponents alike — have become a matter of intense worldwide debate. Supporters see it as a means of ending the threat of nuclear devastation. Opponents charge that the program is an exorbitant boondoggle whose stated objective is ruled out by the limitations of technology. Worse, these critics contend, Star Wars defenses might so upset the fragile balance of forces between East and West that war might become more rather than less likely.

Yet even as the debate has raged, Star Wars re-

Malcolm W. Browne is a science reporter for The Times.

CONTINUED PA

search has moved ahead quickly, consuming more than $3 billion in the last year alone, and giving unprecedented momentum to a broad range of advanced scientific programs.

The exotic new materials and technologies produced or encouraged by Star Wars research promises to have particular importance for conventional warfare, fostering changes in land combat as radical as those wrought by the introduction of gunpowder in the Middle Ages. But spinoffs from the President's initiative are also finding their way into a myriad of civilian fields, including energy production, transportation, communications and medicine. Meanwhile, science itself is gaining new research tools from S.D.I. projects.

Critics of S.D.I. point out that the technological side benefits of Star Wars research could be had much more cheaply and efficiently if they were pursued directly rather than as the unintended offshoots of an extravagant military spending program. But S.D.I. proponents assert that in the absence of such a visionary scheme, it is unlikely that such research would have taken place at all. Weapons research, they say, has been a key element in technological progress throughout history, and has nearly always produced byproducts of immense value to mankind. Costly though World War II was in human suffering and destruction, for example, wartime research bequeathed a cornucopia of consolation prizes to the survivors, including plastics, synthetic textiles, antibiotics, jet aircraft and nuclear energy.

How far the President's vision of a space-based strategic defense will ultimately be carried is an open question. Spurred by concern over Federal budget deficits, Congress has already voted significant cuts in S.D.I. funds, and even the program's strongest supporters concede that enormous technical obstacles still loom ahead.

Yet, even if a continental defense is never actually deployed, the long-term impact of S.D.I. research programs promises to be enormous. In laboratories from San Diego to Boston, Star Wars is no longer a mere phrase or debating point. For better or worse, the controversial Strategic Defense Initiative is already yielding new technologies that seem destined to change the world.

AIR FORCE LIEUT. GEN. JAMES A. ABRAhamson is no stranger to monster-size Federal projects. From 1976 to 1980, he ran the Air Force program that developed the F-16 fighter. Later, he took charge of space-shuttle development for the National Aeronautics and Space Administration, a post he held until 1984.

Now, as director of the Pentagon's Strategic Defense Initiative Organization (S.D.I.O.), the 53-year-old General Abrahamson is responsible for what may turn out to be the biggest Federal research project ever. He currently oversees the distribution of about $6 billion to some 1,300 Star Wars contractors in a program whose size rivals even that of the Manhattan Project, the secret World War II program that created the atomic bomb. (The Manhattan Project, from its inception to the destruction of Hiroshima and Nagasaki, cost $2 billion in 1945 dollars, equivalent to approximately $12 billion today. The current five-year S.D.I. program, which is intended merely to assess possibilities rather than to build a working weapons system, is expected to cost up to $20 billion.)

"When I got here," General Abrahamson said recently as he shared a sandwich with a visitor to his gadget-strewn Pentagon office, "I began looking for a common denominator in all the big technology programs that had been successful — a common factor applicable to S.D.I. But I couldn't find one. For instance, both the German and British jet-propulsion programs were highly successful, but they achieved success under totally different conditions.

"Finally, I came to realize that the common denominator was to be found not in the successful programs, but in the programs that had failed or come in second best. An example was the German atomic-bomb program of World War II, a program that was so highly structured and formal that it was unable to correct itself. By contrast, the Manhattan Project was dynamic, contentious, full of scientific give-and-take, and therefore capable of speedily correcting its own errors.

"I concluded that we needed the same rough-and-tumble intellectual approach — the American approach — to S.D.I. research. I decided that it was better to achieve 90 percent of a bold solution than 100 percent of a timid solution."

The resources now dedicated to finding that "bold solution" represent an enormous national commitment. During the last year, American taxpayers have paid some $3.05 billion for S.D.I. research — nearly $13 for every man, woman and child in the country — and the administration has requested $5.3 billion more in Star Wars money for the coming year. Even if Congress succeeds in cutting this sum — both the House and Senate have voted substantial reductions — S.D.I. will still remain an important component of the national budget.

Star Wars research, moreover, gets contributions from many sources besides formal S.D.I. appropriations. The Strategic Defense Initiative Organization is less than three years old, and virtually all the projects now under its aegis began with other government agencies and organizations. Overlapping research objectives and financing persist, and much of the technology developed by the Defense Advanced Research Projects Agency, the Defense Nuclear Agency and other organizations indirectly furthers Star Wars objectives. An insider acknowledged that "Star Wars money has a way of losing its color after passing through many hands."

When the S.D.I.O. needs something to be invented or built, it pays handsomely and apportions the task to many hands. Predictably, the largest S.D.I. contracts have gone to the giants of the aerospace industry. Heading the 1986 list is the Boeing Company, with contracts totaling $131 million. Other top S.D.I. contractors include TRW Inc., $61 million; Hughes Aircraft Company, $40 million; Lockheed Missiles and Space Company, $25 million; Rockwell International Corporation, $24 million; and the Raytheon Company, $17 million. But Star Wars funds are also earmarked for a wide range of small businesses, government laboratories and agencies (including the Central Intelligence Agency), and academic institutions.

The economic impact of S.D.I. money is ubiquitous and potent. A Stamford, Conn., market research concern, Business Communications Company, has estimated that the commercialization of Star Wars technology will eventually yield private-sector sales ranging between $5 trillion and $20 trillion. The financial inducement for a company to participate in S.D.I. research is so great, in fact, that the S.D.I.O. receives 10 times as many proposals as it can pay for.

Private entrepreneurs can exploit a wide range of inventions and discoveries that grow out of government-sponsored research, and Star Wars technologies are no exception. But the commercial licensing of government processes or inventions is a complex system that sometimes imposes burdensome practical problems. A government agency may be unwilling to grant exclusive long-term rights to the use of an invention or process, for instance, thereby depriving prospective commercial licensees of a competitive edge.

The secrecy of such sensitive military projects also poses a potential problem for the transfer of technology from S.D.I. research to the private sector, but General Abrahamson minimizes its long-term importance: "Of course there are technologies in S.D.I. that are vital to our national interests and are classified top secret. However, you'd be amazed how much of our work is nonclassified or only moderately classified. Our secrecy classification system, like the proposed missile defense itself, is organized in layers, and our policy is to permit the maximum freedom of communication consistent with the national interest. That policy shouldn't pose a real problem for anyone."

"I am determined," General Abrahamson said, "that we not miss the opportunity to capitalize on the results of S.D.I. research and apply it across all facets of our economy and society."

THE COMBINATION OF A thick wallet and a gambler's quest for dramatic gains has already led S.D.I. researchers to discoveries with important implications for fields largely unrelated to strategic defense.

Perhaps the most significant of these areas is conventional warfare, where rail guns and other new "hypervelocity weapons" promise to transform the kind of continental-scale armored combat for which the Soviet and American armies have been girding themselves since World War II.

Both the Pentagon and the Kremlin believe that in future land wars, tanks and armored personnel carriers will decide the outcome of battles. Consequently, both sides press their munitions makers to design ever more lethal projectiles, and sturdier forms of armor to stop the enemy's shells, bullets and rockets.

To defeat the next generation of tough-skinned Soviet tanks, Army planners believe, an entirely new class of weapons might be needed: weapons as superior to today's powder-burning guns

CONT. NEXT P46E

and rockets as the 15th-century harquebus was to even the best crossbow of the day. And thanks to the Strategic Defense Initiative, the electromagnetic rail gun may provide American armored vehicles with just such a weapon.

In contrast to traditional rockets and shells, which are propelled by expanding gases, the acceleration achieved by a rail gun is not limited by the speed of sound; given enough energy, a rail gun can accelerate objects to speeds comparable to those of meteors. In principle, a rail gun standing on the ground could bombard targets on the moon. A rail-gun projectile might even be made to hit a target hard enough to initiate nuclear fusion — a fact noted by scientists seeking to develop fusion energy as an alternative to the fission process that is used to generate electricity in today's nuclear power plants.

Many government organizations have explored the possibilities of the rail gun. But both financing and research coordination were lacking until the Strategic Defense Initiative Organization stepped in.

Among the technologists responsible was Jon Farber, a division chief with the Defense Nuclear Agency in Alexandria, Va. Mr. Farber has devoted much of his career to the building of machines that mimic the destructive pulses of electromagnetic energy emitted by nuclear explosions. Like many kinds of Star Wars weaponry, these testing machines require gigantic pulses of power.

"I realized," Mr. Farber recalled, "that the greatest possibility for quick progress toward an anti-missile weapon lay in the rail gun, and I predicted that by working on rail guns we could accelerate all our S.D.I. programs, reducing development times by six to eight years."

Essentially, a rail gun is an electric motor, in which two metal rails running the length of the gun barrel are the main stationary elements and the projectile itself is the moving part. When a massive electric current is made to flow between the rails via an armature at the back of the projectile, the flow generates an electromagnetic force that drives the projectile forward.

One of the main problems with such a weapon is providing it with a suitable supply of electric power. Not only must the source yield a gigantic pulse of power for each shot, but it must recharge fast enough to maintain a reasonable rate of fire.

Ignoring bureaucratic boundaries, Mr. Farber broached his ideas directly to the S.D.I.O.. "To establish my bona fides, I offered to lend them a power supply of the kind we use in our simulated nuclear explosions," he said. "They agreed, and starting in March last year, the S.D.I. people agreed to share costs with us in the building of a capacitor-powered rail gun. Only nine months later we were able to fire the first demonstration shot. We blasted a little plastic cube right through a thick metal plate, and the resulting hole was impressive enough to convince even stubborn skeptics."

Since then, researchers have devoted their efforts to reducing the size of the containers needed to contain the electric power for the rail gun. Within a few years, Mr. Farber predicts, high-power capacitors charged by generators of various kinds will be small enough to fit not only into orbiting space stations, but inside tanks and other fighting vehicles.

"At present we are substantially outnumbered and outgunned by Soviet tanks, whose big guns can open fire before ours come into range," Mr. Farber said. "Rail guns could reverse that situation and change the balance of land forces in our favor."

ANOTHER KEY AREA of Star Wars development is the interface between computer science and applied physics, in which researchers are confronting the need to process extraordinary amounts of information in the shortest possible time. Future large-scale conflicts, whether in space, in the atmosphere, on the ground or at sea, are expected to unfold too quickly for even the most efficient consortium of human minds to control without massive computer assistance. A reliable, lightning-fast system for planning battles is therefore regarded as vital both to a defense against ballistic missiles and to the conduct of war on the earth's surface.

Part of the challenge lies in the realm of applied physics. Physicists are following several routes toward speeding up the microscopic switches that operate logic gates, the components of semiconducting chips that enable computers to calculate. The opening or closing of a switch determines whether its gate is to register a zero or a one — the binary numbers used for all computations.

Contractors working for S.D.I. or related defense technology projects are working on an entirely new type of computer switch: one that operates optically rather than electronically. An optical switch would be used to transmit or block a beam of light rather than an electric current, and thus benefit from the enormous speed at which light travels. The switch itself could be actuated by light signals; matching pulses of light applied to opposite sides of the switch would open it, and mismatching pulses would close it.

A remarkable new material being developed for both optical and electronic computer switching is a synthetic crystal, gallium arsenide, and substantial S.D.I. funds have been appropriated for pushing its development. Gallium arsenide transmits electrons several times faster than does the silicon used in conventional chips, and can also function as an optical switch.

Another potential optical switch that has attracted official interest is a plastic called polydiacetylene, under development at General Telephone and Electronics Laboratories Inc., of Waltham, Mass. According to Dr. Mrinal Thakur, a senior member of G.T.E.'s. technical staff, an optical switch based on polydiacetylene could handle up to one trillion operations per second; a conventional silicon switch can manage only about one-thousandth as many in the same time. Optical switches, moreover, would be highly resistant to electronic pulses from nuclear explosions that would disable ordinary chips.

Computer experts working on projects related to S.D.I. are also streamlining problem-solving hardware and procedures. One of their approaches is to break up a complex problem into many small elements that can be solved simultaneously and then be rapidly reassembled to yield the required result. This technique of "parallel processing" is a feature of such advanced machines as the Warp, a new supercomputer developed at Carnegie Mellon University, and the Connection Machine, a product of Thinking Machines Inc. According to the Defense Advanced Research Projects Agency, which paid for its development, the latter machine recently took only three minutes to complete a computation over which a powerful International Business Machines Corporation mainframe computer had had to labor for six hours.

The computers and programs S.D.I. is helping to bring into being are powerful tools whose civilian counterparts will have incalculable scientific value, experts say. These machines might be used for long-term weather forecasting, for example, and for creating reliable mathematical models of the atmosphere and the oceans. Environmentalists regard such models as essential in making accurate estimates of the effects of human activities on climate.

Several strategic defense projects seek to use the computer as an adjunct to the human brain, and the outcome of this work in such "expert systems" is applicable to conventional battlefields and civilian needs as well. Two of the latest Defense Advanced Research Projects Agency's computer projects for the Navy not only organize and assess mountains of information but also make recommendations to fleet commanders for solving specific tactical and strategic problems. The machine intelligence behind such recommendations is compounded by its designers from the knowledge of many human experts, and the computer program is capable of adding to its knowledge from its own problem-solving experiences.

Similar programs, many of which are independent of S.D.I. but have benefited from its discoveries, have begun to help physicians diagnose patients and to assist plant managers in spotting problems in production, inventories and quality control.

Computer pattern recognition is another field of great interest to S.D.I. and other defense agencies. A computer capable of recognizing and interpreting patterns can guide a missile equipped with a television eye, singling out the pattern of a target from a background of clutter.

CONT. NEXT PAGE

Missiles are not the only beneficiaries of this work. Related computing ability is at the heart of the advanced research agency's Autonomous Land Vehicle, an eight-wheeled driverless truck from which it is hoped a robot fighting vehicle will evolve. Although their capabilities are still quite limited, such robots may foreshadow not only the advent of mechanical soldiers but of surrogate servants, laborers and bodyguards — the creatures of science fiction.

IN MANY AREAS, S.D.I. funds have played an important role not in fostering new projects, but rescuing or reviving old ones. One significant example has been the Nova laser, completed last year at Lawrence Livermore National Laboratory in Livermore, Calif., at a cost of $187 million and 8 years' construction time. The world's most powerful laser, Nova is yielding experimental data that may contribute both to a beam defense against missiles and to the generation of electric power by hydrogen fusion.

Nova, which fills one of the largest buildings in Livermore's sprawling laboratory compound, was financed by the Department of Energy as a fusion power experiment. The object was to concentrate the combined beams of Nova's many lasers on a pinhead-size target, the implosion of which would initiate fusion in the target's hydrogen core.

But during the last three years, as financing for many fusion experiments has dwindled almost to the vanishing point, defense scientists began using Nova for another purpose: the production and testing of very short-wavelength beams, including X-ray lasers — a type of laser that many experts believe would be peculiarly effective against missiles.

That Nova is being kept active, for whatever purpose, is a source of satisfaction to fusion power advocates. "The present oil glut will be short-lived, and when the crunch comes the energy shortage is likely to be devastating," an engineer at the Electric Power Research Institute said. "Fusion may be our salvation, and Nova may be the route to fusion. If Star Wars keeps Nova alive, it's all to the good."

Besides lasers, beams of charged and neutral particles are under study as possible directed-energy weapons, and these, too, are expected to find civilian applications. The Department of Energy has sponsored experiments using electron beams for sterilizing food and for removing pollutants from industrial smokestack emissions, for instance. Electron beams developed for killing enemy missiles may also serve mankind by fighting cancer.

"The S.D.I.O. is very interested in a potential weapon called the free-electron laser," said Dr. James A. Ionson, a 36-year-old astrophysicist who is in charge of selecting many S.D.I.O. research projects. "And the work that has gone into it shows considerable promise for cancer therapy."

By manipulating a beam of electrons produced by a charged-particle accelerator, researchers have found they are able to "tune" the wavelength, or color, of the resulting beam. Such tuning helps scientists create beams with the short wavelengths deemed effective against missiles, and may also provide the key to a potential new cancer therapy, Dr. Ionson said.

"Electron beams can penetrate tissue to any desired depth, and the depth is determined by the energy of the beam," he said. "An electron beam has very little effect on the tissue through which it merely passes. But when it reaches its penetration depth, it releases most of its energy at that spot. Consequently, a precisely tuned electron beam could be used to hit a malignant tumor with pinpoint accuracy without damaging the surrounding tissue. The technique might be especially valuable in brain surgery."

MANY INDUSTRIES and government researchers are quite comfortable with Star Wars, but the S.D.I.O.'s relations with the nation's academic community is ambiguous. Educators have raised moral and political as well as scientific objections to the attempt to build a missile defense, and many believe it cannot succeed, however much money is pumped into the effort.

Both the Union of Concerned Scientists and the Federation of American Scientists have denounced S.D.I., and some 6,500 scientists and scientific educators have signed petitions pledging not to accept S.D.I. funds.

Still, negative opinions about the strategic merits of the President's program can often be separated from attitudes regarding the broader benefits of S.D.I.-related research. According to a survey conducted last spring by Peter D. Hart Research Associates Inc., two thirds of 549 American physicists polled expressed doubts that S.D.I. could ever defend the entire population of the nation against ballistic missiles, and 62 percent declared themselves opposed to deploying a Star Wars defense.

But despite their general opposition to the development of actual S.D.I. weapons, many American physicists saw merit in the basic research involved; the Hart poll revealed that 77 percent of physicists supported basic Star Wars laboratory research and 21 percent opposed it.

To counter the anti-Star Wars lobbying of several professional organizations, scientists favoring S.D.I. research recently organized the Science and Engineering Committee for a Secure World. Among the group's members is Dr. Martin I. Hoffert, chairman of the department of applied sciences at New York University, who describes himself as a political liberal and an opponent of nuclear arms. "When I first heard of S.D.I., I had no real interest in it," he said. "But I was interested in almost any opportunity for ridding the world of nuclear weapons, and I came to believe that S.D.I. might give us a chance."

Some two dozen major educational institutions are now receiving S.D.I. funds, among them the University of California (Los Angeles and Berkeley), the Massachusetts Institute of Technology and Johns Hopkins University. Besides these, many colleges and universities are recipients of second-hand Star Wars money transmitted through various prime contractors.

Highly qualified physicists are sometimes drawn to Star Wars projects by an inducement at least as potent as remuneration: access to the laboratories, equipment and staffs that can take on research programs far beyond the financial reach of even the richest university.

The cumulative impact of such an influx of funds and assistance on the broader course of American science will, of course, be impossible to measure for many years. But scientists and technical experts both inside and outside the strategic defense program agree that the systems, materials and devices brought into being in the name of S.D.I. will leave a profound legacy. One defense physicist (who asked to remain unidentified) put it this way:

"Some say we've made Faustian deals with the Devil, and there's an element of truth in it, if you happen to look at national defense as the Devil, which I do not. I'm being paid to work in a lab that's more exciting than a toy store. I'm given all the fancy hardware I need for my work, which has to do with very short-wavelength lasers. Do you realize what magnificent scientific tools such lasers will one day give us? We could use them to make holographic movies of the interaction of molecules in living cells, catalyzing the whole field of cancer research. X-ray or gamma-ray lasers will help us understand the nature of life at its most basic level.

"Sure, we're working on weapons, and we hope they'll be very good weapons. But the biggest payoff for many of us is the thrill of personal scientific achievement — achievement that in many cases would be impossible without Star Wars tools." ■

Senators Would Redirect, Possibly Slow 'Star Wars'

Protection for Missiles, Not Population

By Walter Pincus
Washington Post Staff Writer

The Senate Armed Services Committee is calling for a major redirection of President Reagan's Strategic Defense Initiative (SDI), and for a possible slowdown if that will help persuade the Soviet Union to agree to real reductions in nuclear weapons.

In its report on next year's Defense Department authorization bill, the committee said "the major emphasis" of SDI research should be on a "survivable and cost-effective" defense of U.S. strategic forces and not on "comprehensive, nationwide population protection," which has been Reagan's stated goal.

In addition, the committee said the United States "should be prepared to consider adjustments to the pace and scope of SDI if the Soviet Union agrees to significant, stabilizing and verifiable reductions in strategic offensive forces."

In the latest round of Geneva arms talks, which concluded Thursday, the Soviets said that if the United States agreed to continue adherence to the 1972 Antiballistic Missile (ABM) Treaty for 15 years they were ready to negotiate reductions in strategic arms. Defense Secretary Caspar W. Weinberger and others have said this would kill SDI, popularly called "Star Wars," altogether.

The committee recommended what it called a "robust" SDI program of $3.9 billion for next year, $1.5 billion below the president's request. Such a program, the committee said, was "realistic" to meet the threat from Soviet defense research and at the same time provide leverage for U.S. negotiators in Geneva.

In a broader look at Pentagon research, the committee said SDI spending was leading to a sharp reduction in basic technology research directed at other areas of weapons development. It called for reallocating $453 million from the SDI request to other research.

Principal authors of the language refocusing SDI and calling for a balanced technology program were Sens. William S. Cohen (R-Maine) and Sam Nunn (D-Ga.).

The committee report called the funding profile for SDI in the next five years "excessive," in light of the basic design and what it termed disagreement over the goals.

Lt. Gen. James A. Abrahamson, in a luncheon with reporters and editors of The Washington Post yesterday, defended his program and said there was no disagreement within the administration over its goals. The aim is to protect both populations and missiles, he said.

In another action, the Armed Services panel eliminated funds for production of two controversial Navy nuclear weapons, the antisubmarine warfare (ASW) missile and the SM2 standard antiair missile. Sen. Edward M. Kennedy (D-Mass.) initiated this cut. The two weapons also have been eliminated by Congress in past years.

The House Armed Services Committee also cut out the ASW nuclear weapon in its version of next year's authorization bill.