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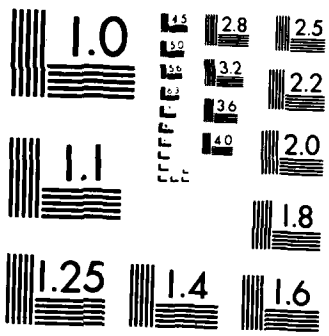

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AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

ARMS CONTROL AND THE PRESIDENT'S STRATEGIC DEFENSE INITIATIVE

MAJOR JAROMIR J. BON 85-0240

"insights into tomorrow"

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The President's Strategic Defense Initiative (SDI) provides the hope for eliminating the threat from ballistic missiles. This study evaluates the impact of SDI on existing and future arms control agreements. Because new or modified space-related treaties are a probable result of the SDI, this study concludes that the best single strategy for arms control negotiations is to preserve overall U.S. interests and maintain open technological options view narrowly limiting any space technology that might [illegible] part of a space-based defensive system.

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PREFACE

In preparation of this study I found that I had to first educate myself on current issues in the areas of strategic defense, defensive technologies, and the theories and language of arms control. Throughout this process I both needed and received a great deal of help. I would like to thank Lt Col Howard DeWolf, HQ USAF/XOXIS, for suggesting the research, providing initial guidance and materials with which to proceed. Major Dave Evans, while a member of the ACSC faculty, was my initial advisor and helped me through the difficult early stages of establishing a framework and putting seminal thoughts on paper. Dr. Paul Godwin, of CADRE and one of my professors in the Auburn University Political Science program, provided key guidance in the area of arms control and pointed me in the right directions to avoid pitfalls in that arena previously unknown to me. Major Barry Britton took over the task of project advisor when Dave Evans was reassigned - Barry's insight and comments were incisive, critical, and immeasurably helpful in preparing the final draft of this document. Similarly, Major John Jensen at USAF/XOXI took over as project sponsor when Lt Col DeWolf was reassigned and deserves special thanks for agreeing to assume this task on very short notice.And finally, I would like to thank my family for putting up with my nights and days at the Air University Library and the demands for silence during the writing and editing of the manuscript. It would have been impossible to even begin this effort without their help; any limitations and errors are purely author-induced.

ABOUT THE AUTHOR

Major Bon earned his commission in 1970 through the AFROTC program, has a B.S. degree in Chemical Engineering from Rensselaer Polytechnic Institute, and is currently enrolled in studies leading to the M.S. in Political Science at Auburn University. He began his Air Force career in Systems Command at Edwards AFB CA, as a development engineer at the Rocket Propulsion Laboratory. From there he transitioned into missile operations and served in several capacities at Malmstrom AFB MT, finishing his tour there as Wing Senior Instructor. Most recently he was assigned to Headquarters Fifteenth Air Force where he performed a variety of duties including operations training, missile operational testing, executive officer, and plans and programming officer. It was in his recent capacity as a briefer, communicating command positions to various VIP groups, that his curiosity became aroused concerning the subjects of strategic defense and arms control, ultimately culminating in this research paper.

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"insights into tomorrow"

REPORT NUMBER 85-0240

AUTHOR(S) MAJOR JAROMIR J. BON

TITLE ARMS CONTROL AND THE PRESIDENT'S STRATEGIC DEFENSE INITIATIVE

I. Purpose: To determine the impact of existing and proposed arms control agreements on the President's Strategic Defense Initiative (SDI).

II. Problem: President Reagan announced the SDI on 23 March 1983 and initiated a coherent national program to search for technologies that promise potential defense against nuclear weapons, primarily short time-of-flight ballistic missiles. Almost immediately, the response from the USSR and the media came back negative. The Soviets maintained that the defensive scheme was really offensive, aimed at effectively disarming the Soviet nuclear deterrent, and words like "first strike weapon" were once again bandied about. Media negativism came from many sources and ranged from "impossible" to "too expensive", finally settling on "destabilizing" and "prohibited by arms control". The purpose of this study was, in part, to wade through the jungle of rhetoric in an attempt to find a central focus to help in determining what the SDI-arms control debate is about.

III. Data: Since very little true primary data exists in this area, much of the analysis was based on a close and careful review of the various viewpoints concerning SDI technologies and policy available in the open literature. The focus was on arms control impact, real or perceived, since this promises to be either a limiting or preventative factor depending on interpretation. Resumption of bilateral arms control talks between the US/USSR make this problem even more current.

IV. Conclusions/Recommendations: The arms race between the US and USSR has both quantitative as well as qualitative components. As pointed out by Samuel P. Huntington in 1958, dictatorships have an edge in quantitative competition, while democracies tend to have the edge in innovation, quality and technology. Our main strategy for arms control negotiation must then be to preserve our technological edge while limiting or reducing those offensive weapons which add to the balance of terror. Failure to utilize the technological advantage produces the same result as negotiating it away.

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Chapter One

INTRODUCTION

Will development of the Strategic Defense Initiative (SDI), also titled the "Star Wars Defense", encourage the development of new arms control agreements or modification of existing agreements in specific areas? Although there are many factors besides SDI which will influence arms control agreements the thesis of this study is that this development must certainly result in new agreements of some sort if we are to limit the direction and magnitude of U.S./U.S.S.R. competition in both defensive and offensive weapons. Furthermore, the content and scope of any agreements must preserve our ability to exploit one of our greatest strengths, our qualitative edge in technology, while we maintain the goals of arms control.

What then, is arms control? One writer has defined it as "restraint internationally exercised upon armaments policy, whether in respect to the level of armaments, their character, deployment or use".(2:vii) He further states that arms control is not equivalent to disarmament, since we can have disarmament without arms control, and arms control that does not lead to disarmament. The classical objectives of arms control are several: (a) to reduce the probability of war - based on the idea that war is morally indefensible and a lack of control over certain types and numbers of weapons may predispose nations to war; (b) to reduce the cost of arms races by limiting directions, types and quantities of weapons and thus allowing societies to use the funds for greater social growth; and, (c) to reduce the level of destruction if war does occur - on the basis that fewer arms will inflict less damage.(2:12;6:10) These are all outstanding goals, on their own or in combination, and they are mentioned here to set the stage for this study. Readers who are interested in reviewing more arguments on the pros and cons of arms control should reference the bibliography for some excellent intellectual works.

Current national policy calls for the achievement of a "balance of power" or "peace through strength". For purposes of this study, in order to simplify an infinitely more complex concept, deterrence will be defined in narrow terms. Deterrence is that level of power which creates doubt in an adversary's mind. This doubt can be manifested in the form of effective resistance or unacceptable retaliation on the part of an opponent. Proponents of deterrence point to the evident success of the policy since no nuclear exchange has ever occurred. Detractors are just as quick to point to other reasons as creating the lack of opportunity for nuclear exchange. Again, the logic for and against this policy is complex and will not be expanded on in this study. However, there are those who believe that the nuclear deterrent with which we have lived for over

thirty years will be adversely impacted, or even made unstable by research or development of the SDI technologies.

It is perhaps as important to realize what the SDI is not, as to recognize what it is. Failure to understand the relatively simple difference has already resulted in misunderstanding and confusion. The SDI is not an attempt at deploying ballistic missile defense (BMD) in space or on the ground, nor is it a substitute for strategic deterrence or arms control. A recent Department of Defense document states that the SDI ,"will create the technological base for sound deployment decisions ... to lessen the awesome threat of nuclear weapons".(25:3) Some analysts state the case for SDI as advancing the president's broad goal of escaping from a complete reliance on strategic deterrence, with an interim goal of enhancing deterrence.(25:3,7) Because ballistic missiles, once underway, cannot be recalled or destroyed, the present administration views them as most destabilizing - it is towards these weapons that the main thrust of SDI technology is aimed.

It is interesting to note that in the 1965 classic The Control of the Arms Race, Hedley Bull did not even begin to fathom the potential military uses of outer space which we believe possible today.(2:Ch VII) The technologies of the sixties resulted in visions of space platforms for possible use in launching weapons at earth targets and only casually addressed possible attacks on other orbiting satellites. State of the art in computers and developing technologies were such that "death rays" were believed to be figments of the science fiction writer's imagination. Today, many of the promising technological breakthroughs are in the area of directed energy weapons, battle management, and system concepts. The tremendous strides in computer power and sophistication may indeed have made possible the concept of "bullet hitting bullet" on the scale necessary for effective defensive systems.

Indeed one of the basic directions, or objectives, of the SDI is to determine if defensive technology has improved significantly enough to provide an advantage for the defense over the offense in any strategic encounter. Improved means for boost phase intercept, and sensors that allow tracking of a ballistic missile from launch to impact are part of the package. The ability to accomplish simultaneous multiple tasks through computerized battle management concepts is another area which currently shows great promise for active defense against ballistic missiles.(24:9,10) Proponents of the SDI claim that the deployed defense would work in layers, and while no one layer would achieve a perfect reduction of offensive weapons when operating independently, when operated as part of a system of layers a significantly large number of incoming warheads can be destroyed.(25:9-16) They further point to the non-nuclear advantages of the defensive weapons, and claim that perfect defense is not the ultimate goal at this stage.(4) The goal is actually to enhance deterrence by creating sufficient doubt that a first use of nuclear weapons will sufficiently disarm or en-

that no effective response can be attempted or achieved. A subsidiary goal is often stated as the lessening of chances that the superpowers will become drawn into a conflict between two smaller nuclear powers. Detractors of SDI point to it as another avenue for continuing the arms race and contend that offensive technologies have, and will continue to have, inherent advantages over the defense.(14:17) Their contention is that whatever the defensive concept, a less costly offensive system can be designed to overcome it. In essence, they believe we would be pouring money into an area that can be easily breached.(23) And finally, there is a viewpoint that could be described as centrist, that contends defensive technologies will work but only when coupled with arms control agreements limiting or reducing the large number of offensive systems in existence today.(16)

The remainder of this study will be devoted to identifying and examining the impacts of arms control on the SDI. Chapter two will be a short review of the technologies identified for further BMD application. In chapter three I will combine technologies and treaties to determine how current and proposed arms control agreements impact on or are impacted by the SDI. Finally, in chapter four I intend to tie all of this information together and provide some suggestions concerning desired future objectives in achieving arms control agreements.

Chapter Two

TECHNOLOGIES

The Department of Defense has identified six categories of technologies for missile defense, they include:
(a) surveillance,acquisition and tracking,
(b) directed energy weapons, or beams,
(c) conventional weapons,
(d) battle management and communications,
(e) integrated, or layered defense, and
(f) counter-countermeasures.
Basically this includes a means for observing the attack, a means for deflecting or reducing it, and a means for putting it all together.(24:1;25:7,8)

This chapter will be devoted to a brief review of the technologies involved in the SDI. The intent is to quickly introduce the reader to the technologies being explored and explain why. In later chapters these technologies will be related to existing treaties to see if the treaty allows development or exploration, or if we must abrogate a treaty to continue research. Ultimately, I will make some recommendations on whether future negotiations should attempt to limit the development of specific technologies and which technologies should be exempt from the upcoming arms talks.

Because ballistic missile vulnerabilities change throughout a typical flight path, a simple, single defensive scheme may not be effective. Several sources contend that the optimum defense against ballistic missiles must be multi-layered to tailor the defensive attack to exploit vulnerabilities inherent in each phase of ballistic missile flight.(4) For example, in the boost phase, the infrared signature of the booster can be easily observed. It is during this phase of flight, lasting three to five minutes, that the missile system is most vulnerable. The signature is clear, the target is large and soft to attack, and the ultimate payoff is simultaneous destruction of all warheads associated with each booster. During the second phase of flight, the upper stage (also known as the bus), warheads and any decoys are deployed well above the atmosphere. The system weakness at this point lies in the length of time, estimated to be between twenty and twenty-five minutes, during which key components are vulnerable. Finally, during reentry atmospheric drag strips decoys away and the warheads become more highly visible, albeit for only a minute or two. During this final phase the warheads are vulnerable to earth based ABM systems placed in the vicinity of known target areas.

What changes have occurred in the last twenty years to make testing the question of BMD feasible? Beginning with the boost phase, several new approaches based on directed energy concepts and conventional concepts such as hypervelocity guns are today believed to be potential candidates.(4) We must

examine all the available candidates, for only by actively pursuing the most promising of the various technologies involved will we be able to make valid judgments on the best approach for transitioning to a defense oriented deterrence. Midcourse intercept has been made possible by revolutionary advances in sensor technology which allows vastly improved detection and tracking. Coupled with potential boost phase candidates, the ability to detect warheads and discriminate them from decoys allows for potential achievement of between 75 and 90 percent defensive kill capability (or destruction of the warhead).(11) The ability of a non-nuclear device to "home-in" on and destroy an incoming (simulated) warhead was recently demonstrated over the Pacific Ocean in the Army's Homing Overlay Experiment. This defense-in-depth, layered and tied together with advanced computers and software, promises to allow management of an active defense against ballistic missile attack. This is not to say that the technical capability exists "on the shelf" for immediate use - there are several analyses that project a high-energy laser could not be ready before 1990. However, as each step is taken and our understanding of the physical and scientific principles improves, so will our ability to accurately predict what the final capabilities of any system might be.(25:2-7)

Very high speed integrated circuits hold forth the promise of yet another leap forward in computing capabilities that will allow us to achieve success in the categories of battle management and integrated defense. In fact, at least one author has recently put forward the thesis that the computer revolution may hold the promise of making weapons of mass destruction obsolescent.(3:51,77)

Countermeasures can be anticipated and even verified through detailed analysis of test observations; we can tell how the other side plans to spoof our system simply by observing what their tests do. Passive measures such as improved decoys, increased use of mass simulators, thermal protection of boosters - all require the user to pay some penalty. One rationale is that if we can somehow force the other side to decrease the number and/or size of the warheads mounted on their ICBM's, then we have in small measure succeeded in our goals. Active countermeasures which seek to attack and disable or spoof defensive systems will similarly have to be anticipated and designed against. One counter to this threat is the potential to develop maneuvering satellites with a defensive capability, which can allow an expensive system to "defend" itself against direct attack.

Critical technologies which will require extensive research programs of ten or twenty years have been identified. They include:

(a) development of a capability to destroy enemy ICBM's in the boost phase, or early in the midcourse phase before warhead deployment,

(b) an ability to discriminate target objects, even when masked

or, the development of interceptor techniques so economical that even decoys can be destroyed at low cost,
(c) survivability of space-based system components through tactics or mechanisms designed to protect subsystems in a potentially hostile environment, and
(d) development of very large software packages containing millions of lines, to integrate all defensive resources.(25:20,21)

These technologies are not impossible. The problems of effective, although not perfect, missile defense are possible to overcome through effort and ingenuity. However, even as strong a proponent of missile defense as General Daniel Graham has stated that the "big problem ... isn't technology or costs, it's the effect of it on arms control".(4:299) The next chapter examines several perspectives from which to view the arms control issues facing the SDI program and the potential for ground or space-based BMD in the transition to a defense dominated future.

Chapter Three

ARMS CONTROL

There are two central themes or arguments that weigh against the SDI program as currently envisioned. First is the argument that any development of defensive weapons is destabilizing to deterrence; this is often stretched to include research on defensive technologies.(10) Second is the contention that such a program will undermine the ABM Treaty. One argument often put forth is that present arms control agreements, because they in some way limit the deployment of potential space based elements of BMD, thereby also effectively limit the direction and scope of research. The purpose of this chapter is to examine in detail the interactions between arms control agreements as an external constraint and the technological research implicit in the SDI.

Global nuclear deterrence, as a strategy, has been in effect for some forty years. In that time of relative peace between the superpowers we have observed large increases in the nuclear weapon inventories of both powers, limited nuclear proliferation, novel employment techniques and changes in policy, limited development and deployment of defensive systems, and often contentious attempts at arms control negotiations.(16) The fact that serious conflict has been avoided speaks well for the robust nature of deterrence - at the very least it seems to have a wide area of stability. While many factors may play a significant role, it does not appear that nuclear deterrence is easily affected by limited developments and the future could well be a continuation of the same, regardless of the nature or amount of political posturing and rhetoric. Deterrence has survived the introduction of MIRV's (multiple independently targeted reentry vehicles), limited ABM (anti ballistic missile) defense, SLBM's (submarine launched ballistic missiles), a limited "freeze" on ballistic missile development by the United States, a U.S. transition from countervalue to counterforce strategy, several agreements on limitation of strategic arms that resulted in increases, and charge/countercharge of cheating on agreements. There is perhaps much to be said for the destructiveness of nuclear weapons as a factor in insuring careful handling of disputes and international responsibility. The current number of states possessing or having access to nuclear weapons is six, with estimates of further proliferation to twenty or forty states by the turn of the century. Perhaps even more frightening is the apparently increasing inventory of these weapons owned by the two superpower states, the U.S. and the Soviet Union. Arms control agreements have been designed primarily to control the application of weapons by limiting the number and the medium (land,sea,air, space) in which weapons can be applied. This has been an implied recognition of the difficulties inherent in controlling technological advances or national expenditures on weapons/research.(2:37)

There are five treaties which potentially impact the SDI through limitation on testing, development, or deployment of weapons or weapon systems which could become elements of a global or national BMD. I will discuss each of these treaties, briefly providing elements or key wording which imposes potential limits.

(a) Limited Test Ban Treaty of 1963

Officially titled the "Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water"; Article I of this treaty prohibits nuclear explosions in space.

(b) Outer Space Treaty of 1967.

Article IV of this treaty prohibits states from placing "nuclear weapons or any other weapons of mass destruction into earth orbit"; it also prohibits military basing on celestial bodies, although military personnel are permitted to perform "scientific research or ... other peaceful" activities. The current understanding of those weapons included in the ban from space does not include BMD.

(c) ABM Treaty of 1972.

Officially negotiated as part of the SALT I agreement, this treaty has the greatest potential impact on the BMD portions of the defense initiatives. The treaty bans deployment of any system designed to counter the flight of ballistic missiles, with the exception of one system each in the U.S. and U.S.S.R.. The Soviet Union has a deployed system around Moscow; the U.S. system in North Dakota was dismantled in 1975-76. Article V bans development, testing or deployment of ABM systems which are space based. This is the primary treaty impacted by/impacting on those SDI technologies which are aimed at achieving global BMD, and is most often mentioned as requiring renegotiation or abandonment, because it limits the directions allowable for developing technologies.

(d) SALT I and SALT II.

Both are bilateral treaties between the U.S. and U.S.S.R.. SALT I is officially titled the "Interim Agreement between the USA and the USSR on Certain Measures With Respect to the Limitation of Strategic Arms" and was entered into force on 3 Oct 1972. This agreement expired in 1977, but both parties have continued to abide by the limits on strategic offensive weapons. The SALT II treaty was signed in Vienna on 18 June 1979 but was withdrawn from Senate ratification in Jan 1980, in the wake of Soviet intervention in Afghanistan. This treaty sets definitions and limits on various strategic offensive weapons and both sides have agreed to abide by the limitations contained in the text. With some differences of opinion and charges/countercharges of violations, both parties appear to be greatly concerned about this unratified agreement. SALT II also restates the ban against orbiting nuclear weapons or weapons of mass destruction previously contained in the Outer Space Treaty, adding a specific ban against fractional orbital missiles. Most recently the Reagan administration has abandoned ratification attempts on SALT II and initiated the START (Strategic Arms Reduction Talks)

on 29 Jun 1982 in Geneva. START broke down in Dec 1983 and have not resumed. In Jan 1985, Secretary of State Shultz and Foreign Secretary Gromyko met in Geneva to discuss possible formats and topics for future US/USSR negotiations on offensive and defensive strategic weapons.(6;26)

A recent legal review of the current treaties in force, bilateral as well as multilateral, concluded that "ABM systems or components may not be placed in space".(7) Just how loosely the term "component" is interpreted may have a significant impact on all aspects of U.S. space policy, including the allowable verification of strategic arms limitation agreements by national technical means. The Soviet Union, furthermore, has attempted to gain a negotiating lead or edge by proposing a potential new treaty dealing primarily with space.

In their recently proposed "Draft Treaty on ... Weapons in Space", which was presented to the U.N. General Assembly in 1983, the Soviets seem to be attempting an all-inclusive approach by proposing bans on anti-satellite (ASAT) weapons as well as any potential space based BMD.(12) Naturally, the items which are subjects of verification and compliance are left rather vague. National technical means of verification and a consultative committee are the main thrusts in these two critical areas. By introducing this type of treaty at the United Nations and playing off widespread propaganda against the "arms race in space", the Soviets appear to be attempting an end run to try to forestall U.S. efforts to perform development testing of an ASAT, or to continue research on the SDI technologies. The basis for this argument is that increasingly, international law is being thought of as developing through consensus rather than consent. This means that if the majority of states in the U.N. signed and ratified this treaty, it could be considered legally binding on the United States regardless of whether we sign (consent) the treaty or not. Soviet proposals and other agreements notwithstanding, the one treaty which potentially exerts the greatest impact on development of the BMD portion of the SDI is the 1972 ABM Treaty.

Since the president's speech on 23 March 1983 set the stage for the Strategic Defense Initiatives, a relative flood of articles and books have been published relating the Ballistic Missile Defense effort implied in the SDI to the ABM Treaty. On the one hand, writers such as Keith Payne argue that enough of the key parameters in the "strategic,...political,... and technological basis for BMD" have changed sufficiently to allow for defense of hard targets and that this development could enhance strategic stability.(21) Essentially, Payne believes that the ABM and SALT treaties did not stop offensive arms development by the Soviets, that the value of the ABM Treaty is suspect, and that we might well consider how to best modify this bilateral agreement with the Soviet Union. On the other hand, Drell, Farley and Holloway provide strong counter-arguments in favor of preserving the ABM Treaty by revisiting some of the anti ABM arguments of the early 1970's. They also point out that

the SDI represents a unilateral change on the part of the U.S., which "may have a serious impact on the Soviet-American strategic relationship even before any deployment decisions".(16) Even as they recognize the magnitude of Soviet efforts in the BMD area, and the fact that the Soviet Union has the world's only operational ABM system in place around Moscow, these authors argue against development of a global BMD by the U.S. because they believe the transition to a defense dominated world would be "very difficult to manage". They conclude, as do many others, that the best way in which to transition to a defense dominated, or influenced, deterrence is by coupling SDI with arms control to limit offensive systems. To a great degree, this is exactly what is taking place at Geneva. Both the U.S. and the U.S.S.R. have determined that an arms control approach which couples offensive and defensive weapons is most promising and desirable. The key to these negotiations will be to proceed slowly and carefully, to insure that a quid pro quo is achieved while simultaneously addressing the arms control skeletons in the closet of the past - verification and compliance. In chapter four I will review and provide some further recommendations for U.S. strategies in the coming arms control negotiations.

Chapter Four

ARMS CONTROL AND THE SDI

[illegible] other sources contain basic arguments for and against the SDI. Those in favor argue that some form of ballistic missile defense is technologically feasible today, and that we should not wait for some future date and futuristically perfect technologies. Their view of arms control is rather pessimistic, colored more by the numerous failed and violated agreements than by the promise of an armament or at least tension-free future.(4) Against any form of missile defense, and thus against some of the basic assumptions incorporated in the SDI, are those who argue that any defense is destabilizing to deterrence and anything short of perfect defense might lead to war as opposed to deterring it. One of the oft repeated arguments is that if even one nuclear warhead made it through a defensive shield, this would represent a disaster of proportions previously unknown to us. Central to this way of thinking is the idea that a transition away from excessive nuclear arsenals is possible through strict adherence to an arms control agenda; that arms control is a sufficient goal in and of itself. There are, apparently, no observable instabilities in this approach.

To preserve order and logic, I believe we need to examine in an unemotional fashion, what things have changed in the last twenty years to make a defense-oriented future more feasible and potentially desirable. Strategically, the nuclear balance facing the United States is not the same today as it was twenty years ago. While we essentially maintained our force levels the Soviet Union produced vast quantities of modern weapons. In fact, the accuracy associated with these new weapons made the survivability of the land based leg of our strategic triad suspect. Former Secretary of State Kissinger has pointed out that traditional arms control theory was based on stationary missiles and relatively inaccurate warheads, and inasmuch as this is no longer the case, the very basis of current arms control may be technologically obsolete.(22) As a matter of fact, technological advances in every category of human endeavor continue to provide an ever increasing panorama of possibilties.

In the 1960's ABM interceptors were relatively crude and depended on nuclear warheads, very large and vulnerable radars, and sensors which were easily fooled or spoofed. Additionally, the computer technology available was not expected to be capable of handling the complex hierarchy of command and control required for an effective and survivable defense. Because the defense was more costly than offensive counters, and precisely because the defenses were potentially more vulnerable than the resources they were meant to protect, it became attractive for both the U.S. and the U.S.S.R. to negotiate a way out of the immediate exploration of defensive development. However, both countries maintained an active research effort aimed at the

basic technologies as permitted by treaty. The Soviets even continued to maintain an ABM field around Moscow. Today, the technology necessary for a transition to provide defense against ballistic missile attack is far from mature, but the advances of the last two decades are promising enough to allow the envisioning of a shield that may be able to provide a defense which can serve us through the difficult transitory period from reliance on offensive to defensive deterrence. One of the arguments used against defenses is that they are not perfect. Edward N. Luttwak calls this a fallacy, in that there is a "tendency to evaluate defensive systems in absolute terms", while a better way to measure the value of a specific defense is whether it effectively counters the threat it was designed against.(5:61) There is something to be said in defense of those who correctly point out that even one modern warhead impacting on U.S. soil would be a catastrophe the likes of which has never before been visited on our populace.However, this has to be weighed against the potential for complete devastation and annihilation if a massive attack is not blunted, deterred, or even avoided as we search for stability at lower numbers of nuclear weapons. For those who argue "Why Even Good Defenses May Be Bad", the only answer may well be because "no defenses are worse".(17) Arms control, when coupled with the promise shown by the SDI, may hold the key to lowering levels of offensive armaments in the arsenals of both superpowers and thus redressing the "balance of terror".

The classic goals of arms control were discussed in chapter one. Paul Nitze has recently suggested that the predominant goal of arms control is to reduce the danger of war.(15) Once negotiations are joined, the question of what quantity or quality becomes paramount. Will we achieve the desired control by limiting the amount of a nation's wealth spent on weapon production, by specifically banning the weapons themselves, or by banning the effects of certain physical phenomena when used as weapons? For example, while lasers are being examined for their potential in anti-satellite or BMD application, it would not be difficult to imagine peaceful and necessary space applications that would be lost to humanity if we react with a complete ban on lasers in space. In other words, we must insure that peaceful uses in the interests of humanity are not banned in the process of achieving the control of arms. Finally, in an atmosphere of mutually hostile interactions, the twin problems or obstacles of verification and compliance will continue to cloud negotiations. On-site inspection has been the means most often insisted upon by the United States, and most often rejected by the Soviet Union. We are then left with "national technical means" (NTM) of verification which have been formally protected in various treaties and agreements. For the most part NTM refers to reconnaissance satellites, which with improved optics and sensors have proved adequate for the task. In many cases NTM have proven to be more satisfactory for verification than any other alternative schemes currently available for

monitoring compliance. The most common form for insuring compliance appears to be the consultative committee or commission (as in the ABM Treaty of 1972). These bodies meet periodically to provide a forum for exchanging questions, views, and explanations for things that may appear to be violations of agreements. However, even in the multilateral agreements such as the Outer Space Treaty , there are effectively no sanctions which can be applied against a treaty violator. Past lessons demonstrate that treaty abrogation or withdrawal may be one form of reaction to violations, but rather than serve as a punishment, such action may serve to reward and provide propaganda material to a belligerent and bellicose nation. Whatever happens in the future, it appears that the most effective (or at least the only immediately available) form of sanction for non-compliance will continue to be more rhetoric and appeals to "world opinion". In sum then, we need to be as careful of binding our future and the future of the world to arms control as we are to binding it to new strategies or weapons.

In a memorable 1958 essay titled "Arms Races: Prerequisites and Results", Samuel P. Huntington posed the existence of two types of arms races, one qualitative and the other quantitative.(1:270-315) He then hypothesized that the quantitative arms race is more likely to lead to war and explored the historical basis for this belief. The quantitative race is equated to a "marathon of undetermined distance", while qualitative races more closely approximate a series of sprints, "each beginning with a new starting line". Nearly thirty years ago Huntington accurately forecast that the development of ballistic missile defenses might form the next arena for an arms race between the superpowers and concluded that a "qualitative race tends to equalize the difference which might otherwise exist between the ability and willingness of a democracy to compete with a totalitarian dictatorship".(1:314) It is this qualitative edge that must be preserved, whatever the goals set for negotiating future arms control agreements.

As we attempt to study the possibility of transition from an offense to a defense dominated deterrent strategy as outlined by President Reagan on 23 March 1983 (27), we must ensure a clear understanding of the many and often conflicting goals involving national strategy for survival, arms control, disarmament, and peace. It may be emotionally and even politically tempting (in the short run) to yield key elements and future potential in an effort to achieve "peace" in the present. There is no equation or empirical evidence directly linking arms control and peace (except in the temporary case of the war victor disarming the vanquished), just as the evidence showing a correlation between arms racing and war is also inconclusive.(8;18;19;20) Furthermore, the Director of the U.S. Arms Control and Disarmament Agency, Kenneth Adelman, recently revisited the question of achieving arms control with and without agreements. (3) The bottom line in insuring our national

survival and prosperity is technological quality. The essence of quality and innovation must be preserved even as we initiate a new dialogue with the Soviet Union , regardless of what we achieve in offensive weapons reduction.

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