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**TAMING THE TECHNOLOGICAL BEAST:
THE FAILURE OF SALT II TO INTRODUCE STABILITY INTO
SUPERPOWER STRATEGIC NUCLEAR FORCES STRUCTURES**

by

RON E. STANSFIELD

A thesis submitted to
the faculty of Graduate Studies and Research
in partial fulfilment of
the requirements for the degree of

Master of Arts

Norman Paterson School of International Affairs

Carleton University

Ottawa, Ontario

April 27, 1992

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submitted by Ron E. Stansfield, B.A.

in partial fulfilment of the requirements for
the degree of Master of Arts

Thesis Supervisor

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ABSTRACT

The quality of weaponry and its effect on policy and war-making has not been examined to the same degree that quantity has. Nuclear weapons are qualitatively different from conventional weapons. This qualitative difference has had an impact on their utility as a tool for national policy. It has made these weapons largely unusable. The results of efforts to reduce the influence of nuclear weapons, i.e. arms control, have been modest to date because they have concentrated on quantity, not quality. The criteria for effective arms control must be modified to place more emphasis on quality if the issue of nuclear weapons is to be effectively addressed in the future. A comparison of the SALT II negotiations and the concurrent development of superpower strategic arsenals during the 1970s proves the point.

My thanks to Julie for
her support, guidance,
patience, and enthusiasm

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CHAPTER ONE

INTRODUCTION

In Greek mythology, the god Prometheus was punished for revealing the secret of fire to mere mortals by being staked to a mountain top, where his body was set upon every morning by vultures, only to heal itself once again at the end of each day's torture. For Prometheus, life became a viciously repetitive cycle of nightly fear and terror at the thought of the coming day's new anguish and suffering. His punishment for the revelation of forbidden knowledge was thus not only the physical pain associated with the daily visiting of the vultures, but also the psychological trauma induced by the nightly paranoia and anxiety triggered by the experience of the past and the anticipation of a similar tomorrow.

The nuclear fire unleashed in the now famous Trinity atomic test at the Alamogordo facility in New Mexico on July 16, 1945, has bestowed upon the human race its own form of Promethean agony. The splitting of the atom transformed the modern world in the same way that the discovery of fire forever altered the lives of our Neanderthal ancestors. Like Prometheus, we have been punished both physically and psychologically for our scientific curiosity and transgression of the nuclear threshold. In the first instance, on two occasions in August, 1945, 150,000 souls disappeared in momentary flashes at Hiroshima and Nagasaki.

Tens of thousands of others were to die a more prolonged and agonizing death from the secondary effects of the blasts. More importantly, however, for the nearly half century since, humanity as a whole has struggled with the heavy moral burden of the impact of nuclear weapons on the historical evolution of the species. While the cities of Hiroshima and Nagasaki may have physically risen from the ashes of the holocaust, two generations of humanity have in the ensuing decades borne the psychological scars resulting from life under the nuclear sword.

This paper attempts to analyze the impact of nuclear weapons on traditional means for managing interstate relationships. These traditional means have been heavily dependent upon the competitive, inherently antagonistic epistemology of the realist paradigm of international relations. Attempts to offer up the theory and strategy of deterrence as sufficient justification or rationale for the possession of nuclear arms have not been entirely convincing. This ultimately questions, as a result, the very utility of nuclear weapons as tools for national policy.

The post-war period, which has also coincided with the nuclear age, has by contrast seen a shift toward a new more cooperative and interdependent approach to international relations, commonly defined as pluralism. This is not to suggest that the terrible potential for widespread and indiscriminate destruction associated with nuclear weapons

has necessarily been the catalyst for this shift. A linkage is, however, distinctly evident in the other direction where the transition from competition to cooperation has created a potentially useful roadmap, mechanism, or regime for effectively managing the existence of these weapons. The potential compatibility of the cooperative approach with the questionable utility of nuclear weapons is obvious. The resulting process which has evolved over the past four decades has become generically labelled as "arms control."

Arms control, however, remains a concept widely misunderstood by both governments and the public at large in terms of its intended objectives and ultimate results. Some associate the term with disarmament, or the elimination of nuclear weapons. Others see it as merely a mechanism for enshrining and legitimizing the continued existence of such weapons. As a consequence, contemporary arms control efforts, as epitomized by the history of the strategic nuclear arms negotiations between the United States of America (US) and the Union of Soviet Socialist Republics (USSR), have often been misguided, misdirected, and misinterpreted.

It is not surprising, therefore, that the results of these negotiations, as seen particularly in the case of the Strategic Arms Limitation Talks (SALT) have been viewed as largely unsatisfactory by various interest groups in both countries for widely divergent reasons. With the evolution of the world order from the post-war bi-polar East-West

relationship to another as yet undefined but still nuclearized international system, it is pertinent to revisit the issue of arms control in both theory and practice to identify current weaknesses and propose possible remedies if the concept as pursued in the past is to remain a relevant player in interstate relations today and in the future.

In this light of the above considerations, the generally-accepted three-dimensional arms control relationship between policy-making in the political sphere, military planning and doctrine, and economic/arms race considerations will be re-examined in the context of the perceived inevitability of technological progress and innovation. The success of the two superpowers, the United States and Soviet Union, to successfully address the issue of stability in the nuclear age through the process of the strategic arms control negotiating process, and more specifically SALT II, will be balanced against the concurrent technological evolution of their respective strategic nuclear forces as a result, or in spite of, these arms control efforts.

In analyzing the SALT II negotiations as an example of effective arms control based on the above considerations, four major hypotheses will be at issue:

- (a) the SALT II agreement influenced the quantity of the strategic nuclear arsenals of the two sides;

This hypothesis follows the widely-held view of the primary objective of arms control which assumes

that the number of nuclear weapons on both sides is a significant factor in the stability/security calculation, and implies that the lower the number of weapons, the greater the degree of strategic stability and national security achieved.

(b) technological considerations influenced the quality of their strategic nuclear forces;

This hypothesis suggests that a second factor in the stability/security calculation in addition to quantitative considerations is the quality, nature, or technical characteristics of the nuclear weapons systems in each country's arsenal.

(c) the stability of a superpower's strategic nuclear arsenal is a function of both quantity and quality;

Hypothesis three suggests a synergistic interrelationship between the number of nuclear weapons in a nation's military arsenal and the technical characteristics of each of these weapons. Recognition of this synergy is critical in determining a nuclear force's effectiveness in an offensive capacity and its survivability in a defensive mode. The relationship between this offensive and defensive capacity determines the degree of stability of these forces.

(d) the SALT II process resulted in superpower strategic nuclear force structures which were asymmetrical and unstable.

This final hypothesis draws the conclusion that, given the importance of both quantitative and qualitative considerations in determining strategic

stability at the nuclear level, and given the ostensible goal of arms control to increase strategic stability (and by inference national and international security), the SALT II agreement of 1979 was not an example of effective arms control.

The following chapter will attempt to develop an understanding of the beginnings of arms control in exploring the relationship between realism and pluralism, deterrence and arms control, in the evolution of political and military thinking on the utility of nuclear weapons in the post-war period.

Chapter three will then address contemporary arms control theories, using these theories to construct a model "stability triangle" useful in examining the superpower nuclear negotiating process and underlining the tensions among the political, military, and economic priorities of the process. The weakness of this model in terms of its consideration of the effect of technological progress or innovation on arms control will be identified and a modified three-dimensional model explored.

The traditional three-cornered two-dimensional theoretical framework will then be used in chapter four in analyzing the rationale and outcome of the SALT II negotiations which occurred from 1972-79.

Chapter five will test a number of the common assumptions drawn from the final terms of the SALT II agreement by examining the concurrent evolution of Soviet

and American strategic nuclear forces during the same period, the effect of this evolution on international stability and superpower security, and the impact of the SALT II treaty on these forces.

In its concluding section, the paper will return to the four original hypotheses established above and argue that the final terms of the SALT II agreement failed to adequately address all of the three aspects - political, military, and economic - traditionally identified by arms control theorists as the elements of an effective strategic arms control process. As a result, the contribution of SALT II to international stability and security was highly questionable.

One can also muse, however, whether it is possible for the arms control process to ever adequately address all three aspects as long as it adheres to the currently-accepted two-dimensional theoretical model. Can the impetus of technological progress ever be successfully addressed by traditional approaches to arms control? Controlling the quantity of weapons may be an admirable endeavour, but is it relevant if new generations of remaining weaponry pose ever-increasing dangers to international stability and security?

Finally, in completing our speculation on alternative scenarios, and accepting that the world is a far from perfect place, one must also wonder if SALT II was nevertheless the best we could have hoped for under the circumstances. Inherent in such consideration is

speculation on how might the world have looked without SALT II.

These insights into the relevance and utility of the strategic nuclear arms control negotiating process as it unfolded over the past two decades could still hold a number of valuable lessons for the post-Cold War, yet still nuclear, world. The analogy of Prometheus is a valid one. Our infatuation with technology has yet to be matched by our capacity to effectively control that which we invent. Nuclear weapons may yet prove to be Humanity's ultimate agony.

CHAPTER TWO

THE CONUNDRUM OF NUCLEAR WEAPONS: ILLUSION VERSUS REALITY

A well-known French general once remarked that the difference between a bayonet and a nuclear bomb was that in the case of the former, one could use it but not sit on it, while in the case of the latter, one could sit on it but not use it. In the first instance, this homily questions the very utility of nuclear weapons as a tool for war and the achievement of military victory over an opponent. In the context of using a robust military capacity to prevent conflict and war, however, it also succinctly encapsulates the conundrum posed by the existence of nuclear weapons for traditional methods of pursuing interstate relations.

Since the end of the Second World War, the emphasis placed on nuclear weapons by the dominant powers in the international system has forced an adjustment in the methods by which these nations have sought to ensure their national security and sovereignty, achieve their national goals and objectives in the international environment, and ensure their hegemonic positions in that environment. It has also influenced to a degree the actions of the other nations of the system in terms of the methods perceived to be available for achieving their own particular ambitions and objectives.

This has been especially so in the case of deterrence, a concept which has enjoyed sustained popularity as a foreign policy tool for much of the recorded history of

civilization. The deterrence associated with the post-war period has, however, been a different kind of deterrence, both in theoretical and strategic terms, underwritten primarily by the existence and overriding preponderance of the huge nuclear arsenals of the Soviet Union and the United States. The subsequent requirement to design security policies which both bear these weapons in mind and give them some semblance of utility in the preservation of national and international security has preoccupied strategic thinkers for almost five decades. Such considerations will become increasingly relevant with the recent expansion in the number of nuclear weapons states resulting from the demise of the USSR.

Despite a pervading fixation with the existence of nuclear weapons, their proliferation both vertically and horizontally over the past four decades (1), and the repeated attempts to justify their utility by seeking to link them with the theory and practice of deterrence, it is equally evident that these attempts at linkage have ultimately not only undermined the concept of deterrence as theory and policy prescription, but also led to an erosion of confidence in the weapons themselves. This erosion is reflected in the increasing interest displayed during the past two decades in nuclear arms control. Not only have strong arguments been offered in some circles concerning the political and military irrelevance of nuclear weapons, serious concerns have also been expressed about the growing

irrelevance of deterrence in an increasingly interdependent world.

As Levinger indicated, "deterrence has characterized the relations between antagonistic neighbouring tribes and states since the dawn of weaponry (2)." While the concept of deterrence can, of course, be applied to any level of human interaction (Schelling, for example, has often used intra-family relations as a model(3)), its importance as both a theory of international relations and a strategy for the pursuit of national policy owes much to the existence of the nation-state system and the dominance of the classical realist paradigm.

In the absence of any central authority with the power to do so at the international level, nations have for the past four centuries been left to their own devices in attempting to protect their interests. These efforts can be cooperative in nature, and have become increasingly so in the modern age as interdependence has reduced national barriers and virtually eliminated autarky. Realism's conflictual outlook, exacerbated by a burgeoning number of nation-states (4) and the increasingly finite nature of the earth's resources and ecosystem, has nevertheless proven strikingly resilient.

While diplomatic means of regulating interstate relations, such as balance of power, alliances, or collective security arrangements have had some success in mitigating the conditions of international anarchy, the

overt use of threats to prevent, or deter, actions by another state which are deemed incompatible with one's own goals and objectives has also been seen as a necessary, if not effective, means of pursuing the national interest. The development of deterrence in theory and its pursuit in practice have therefore been a major preoccupation of international relations scholars and national foreign policy-makers. Deterrence is grounded in the realist approach to interstate relations, although the development of a pluralist interdependent dimension more recently can be demonstrated in the efforts of theorists to grapple with the nuclear conundrum.

George and Smoke emphasized that despite efforts to define its theoretical underpinnings, deterrence "is a commonsensical and instinctive practice (5)." While its implicit practice probably dates from the first cognitive conception of the notion of possession, attempts to understand and analyze the basis for deterrence and its use are relatively new. This new interest in deterrence in theory and practice stems no doubt from the imperative imposed by nuclear weapons.

While conventional pre-nuclear deterrence theory focussed on deterrence either by defence of one's own assets or through the threat of punishment for an opponent's unwanted actions (6), the atomic annihilation of Hiroshima and Nagasaki in 1945 created, however, a major conundrum for deterrence theory, forcing a major revisiting of the theory

to account for the existence of such massive destructive power. The pre-occupation of post-war deterrence theorists with the nuclear dimension and the decision-making process has not been without good reason. The emergence of two superpowers, each increasingly dependent upon the capability of destroying the other, and both bent on preventing the expansion of the other's influence globally made this inevitable. The pursuit of a deterrence policy based on the possibility of the destruction of the deterrer leaves no room for error on the latter's part. All the more reason, therefore, to improve one's understanding and application of the concept.

Jervis chronicled three distinct waves in the struggle of post-war deterrence theorists to address the nuclear challenge (7). Jervis saw the first wave emerging in the years immediately following the war in the early writings of Brodie, Wolfers, and Viner, who sought to formalize the use of nuclear deterrence merely as a continuation of the realist concept of deterrence by punishment (8). Much of this discussion implicitly accepted the nuclear superiority, if not outright monopoly, of the United States. According to Brodie:

"If the agressor state must fear retaliation, it will know that ... it will suffer a degree of physical destruction incomparably greater than that suffered by any defeated nation in history ... under those circumstances, no victory, even if guaranteed in advance - which it never is - would be worth the price (9)."

Drawing upon classical realism's assumption of the rational unitary state actor, first generation nuclear deterrence theorists borrowed from economic rational choice theory to explain the relevance of deterrence in terms of cost-benefit calculations made by rational decision-makers obsessed with utility maximization (10). Maxwell noted that the price each party is willing to pay to achieve an objective depends on the value each places on that objective (11). Schelling put it another way;

"a threat has to be credible to be efficacious, and ... its credibility may depend on the costs and risks associated with the fulfillment for the party making the threat (12)."

The thesis following from this rationale implied that the cost of nuclear war outweighed the benefits to be gained from its initiation, thus an opponent would be deterred.

The second wave, occurring in the late 1950s and early 1960s, was dominated by Brodie, Wohlstetter, Schelling, and others who began to recognize the limitations of the utility maximization model, particularly its emphasis on one-dimensional unilateral decision-making. They saw a need to better understand the interactive nature of interstate relationships in an environment where the stakes had increased significantly, and undertook a more detailed analysis of nuclear deterrence theory and practice largely through the use of game modelling (13).

Quester called this particular period the "golden age of nuclear deterrence theory" when most of the thinking on

the problems of nuclear war, limited war, escalation, and tacit bargaining were promulgated (14). Not only did these theorists attempt to define the role of nuclear weapons within the spectrum of force, but each also developed a theory of international relations within which it might fit. These efforts tried to shore up the continued relevance of deterrence by focussing on the bi-polar conflict between East and West, emphasizing its nuclear dimension, and viewing deterrence as the sum of the reality of massive destruction as a consequence of its failure plus the desire therefore for mutual restraint. Much of this intellectual debate attempted to use fear of mutual annihilation to highlight the desirability of including a degree of uncertainty in the deterrer's calculations:

"The threat of retaliation does not have to be 100% certain: it is sufficient if there is a good chance of it, or if there is the belief that there is a good chance of it. The prediction is more important than the fact (15)."

At the same time, it was this issue of certainty versus uncertainty which initiated increasing doubts about the utility of nuclear weapons as the post-war period evolved. This was reflected in the work of the so-called third wave of deterrence theorists who throughout the last two decades have generally focussed their attention on the theory's intellectual and practical limitations (16). These authors have not sought to protect the traditional underpinnings of deterrence theory but rather to identify their flaws in an effort to improve its explanatory power and relevance. To

respond critically to those who would attempt to simply apply classical deterrence theory to the use of nuclear weapons, the energies of Jervis and his contemporaries have been devoted to the exploration of the psychological-sociological dimensions of human interaction and the decision-making process.

The emergence of this revisionist deterrence school coincided interestingly (but perhaps not surprisingly) with the resurgence of pluralism in the 1970s as a direct challenge to the pre-eminence of realism in IR theory (17). In comparison with realism, the pluralist paradigm, while acknowledging that anarchy and conflict exist at the international level, takes a more benign view toward the possibility of their limitation through the use of international mechanisms and institutions which encourage greater political cooperation and interdependence between states (18).

In this increasingly complex and interdependent international environment, doubts began to be raised about the adequacy of the unitary rational actor model (19). The concept of deterrence had, after all, been transformed from the search for security through self-protection, or through the threat of imposing unacceptable damage upon the other, to ultimately, the spectre of imposing unacceptable damage upon oneself (20). This uniquely nuclear form of deterrence in theory and practice became parochially known as Mutual Assured Destruction (MAD) (21).

Concerns of third wave nuclear deterrence theorists focussed therefore on the psychology of decision-making, and the emotional and cognitive factors which can influence decisions and the course of world events. In particular, issues of rationality versus irrationality, the propensity for risk-taking and the variables of information filtering, misinformation, or misjudgement created difficult problems for the validity of the classical deterrence model in a nuclear scenario. The utility of a concept as a policy prescription becomes highly dubious if it does not satisfactorily address such issues as risk-taking, rewards, things that can go wrong, probability calculations, domestic factors, the commitment of the actors, and the legitimacy of their interests - all critical issues in a world bristling with nuclear weapons. While deterrence may be a useful policy when leaders are motivated by opportunity rather than need, have the freedom to exercise restraint, are not misled by grossly distorted politico-military assessments, or are vulnerable to deterrence threats, these kinds of textbook scenarios are few and far between (22).

These theoretical analyses of deterrence need to be taken to their logical conclusion. The breadth of post-war academic debate on deterrence should not lead to automatic assumptions about its validity as a theory. The debate, despite its richness, has masked fundamental theoretical flaws which in turn have serious ramifications for the utility of deterrence as a policy-making tool. Indeed, one

of the few positive benefits accruing from the existence of nuclear weapons may be that, ironically, these weapons have clearly exposed the inadequacies of the concept. Deterrence, contrary to popular perception, does not stand up well to rigorous analysis (23).

As Bryson so eloquently stated, "models are marvels of mathematics; but crude imitators of reality (24)." The same can be said of many theories. Nevertheless, the relationship between theory and policy cannot be ignored so long as the goal of the theorist is to offer the decision-maker an accurate perception of reality, and a range of practical policy options in response. All the more reason therefore that the theory be valid.

Deterrence in practice, like its Clausewitzian alternative of war, has been regarded as one of the many instruments available for the pursuit of foreign policy (25). One can identify a direct correlation between the various forms of deterrence as identified in theory, and the nature of the international system in which each has operated. The multi-polar non-nuclear international orders which existed prior to the Second World War and which were dominated by the realist perspective stimulated the pursuit of the traditional deterrence strategies of denial or punishment. The world system which emerged from the Second World War, on the other hand, had a profound impact on deterrence strategies pursued subsequently. As indicated earlier, this post-war world has been characterized, until

recently, by three factors - growing interdependence, rigid bi-polarity, and the existence of nuclear weapons.

The puzzle facing the United States and the Soviet Union, the two nations which dominated the first half century of the post-war period, became therefore how to continue to apply deterrence to achieve national aims and objectives bearing in mind these three overriding influences. The superpower rivalry, the importance attached to nuclear weapons, and the growing permeability of national borders brought on by these weapons fundamentally changed, however, not only theories of deterrence, but the nature of deterrence strategy as practiced by the system's major players, ultimately calling into question the continued relevance of the concept as a result.

The nuclear cataclysms visited upon Japan, as in the case of deterrence theory, changed forever the face of deterrence as a national strategy and policy for the superpowers. In echoing Bryson, Bertram pointed out that the dawning of the nuclear age underlined the necessity "to adapt the concepts to the realities in order to produce a basis for rational policies (26)." Nuclear weapons had stood much of realism's basis for deterrence on its head. The complete vulnerability of nations to nuclear attack and annihilation made the notion of deterrence by denial impossible. While the offensive nature of nuclear weapons made deterrence by punishment viable in one sense, the deterrer's own vulnerability to retaliation made such an

option unfeasible. The linkage between deterrence and war was no longer valid, as the idea of nuclear war as a result of deterrence failure became unthinkable. Nuclear deterrence quickly became an end in itself, rather than a means to an end.

Deterrence policy depends upon what one is trying to deter, and how one intends to do it. In the case of the superpowers, it was inevitable that the common coinage would be the development of a capable nuclear arsenal. This was the logical conclusion drawn from the USA's determination to maintain its nuclear superiority, the Soviet Union's subsequent sense of inferiority and vulnerability, and its desire to compensate accordingly. In the case of the former question, however, the reasons for each developing nuclear weapons were markedly different.

The USA's overall goal throughout the post-war period has been the entrenchment of the status quo through the projection of power globally and the protection of its interests abroad against perceived Soviet expansionism - the so-called extended deterrence. The USSR's deterrent posture, when stripped of its ideological rhetoric, was consistently preoccupied with the defence of its territory, and the struggle to change the status quo imposed by US hegemony (27). All international events came to be examined through the glasses of the superpower rivalry, nuclear power was equated with superpower status, and nuclear deterrence

was regarded by each as the best means of restraining each other's nuclear power.

These shared perceptions of the utility of nuclear deterrence did not, however, result in a corresponding symmetry in deterrence strategies or an understanding of each other's actions, essentially undermining as a result any sense of the mutuality deemed necessary by theorists for effective deterrence. Jacobsen accurately characterized the historic asymmetry of the superpower nuclear deterrence strategies as the "scissors phenomenon (28)."

The evolution of US deterrent strategy throughout the post-war period has been largely a struggle with the transition from nuclear monopoly to superiority to sufficiency and finally to parity with the USSR. The preponderance of the nuclear dimension in US deterrence strategy is a direct reflection of the early importance given to nuclear weapons as a tool of American post-war foreign policy. Eisenhower, reassured by the USA's nuclear monopoly and determined to reduce defence expenditures, saw nuclear weapons as a cost-effective means of pursuing the containment strategy embodied in NSC-68 of 1950 (29). This dependence was reflected in the policy of massive retaliation which dominated US deterrence strategy until the early 1960s, best characterized by Eisenhower's public commitment to "hit them with everything we got (sic) (30)."

Nevertheless, recognition of the USSR's growing nuclear capability soon forced the introduction of a note of caution

into this strategy. Eisenhower himself was careful to delineate between the threat and use of nuclear weapons. Despite the debate taking place at the time on the merits of preventative versus retaliatory use, both Eisenhower and Dulles favoured a "no-first use" policy, which immediately undermined the credibility of massive retaliation as an effective deterrence policy (31). Kennedy and McNamara soon recognized this deficiency and accepted a new strategic relationship with the USSR based on the acknowledgement that the use of nuclear weapons by one side would ensure nuclear retaliation by the other, resulting in MAD.

This shift was the most significant aspect in the transformation of post-war deterrence strategy. For the first time, not only did the futility of nuclear weapons as a tool of war become evident to US decision-makers, but so did their effectiveness as a tool of deterrence. Nuclear weapons, as Bertram has stated, became saddled with their "growing relativity (32)", i.e. their inability to address deterrence at the sub-nuclear level. Furthermore, even at the nuclear level, the traditional desirability of striking first if deterrence failed was replaced with an emphasis on merely ensuring the USA's ability to retaliate in the event of a nuclear attack. McNamara declared, "Nuclear weapons have no military use whatsoever, except to deter one's opponent from their use (33)." The policy of MAD dominated the era of rough strategic parity during the late 1960s and early 70s, but US decision-makers became increasingly

frustrated with a strategy which not only compromised the territorial integrity of the United States, but also constrained US efforts at extended deterrence (the feasibility of NATO's Flexible Response doctrine was, for example, always suspect). The Carter Administration's Presidential Directive 59 (34), and the Reagan Administration's investigation of prolonged nuclear war-fighting (35), epitomized US efforts to reinforce the utility of deterrence through the attempted refinement of the options available for nuclear weapons use. The relevance and utility of such efforts, largely reflected in the arcane manipulation of the target sets identified in the Single Integrated Operating Plan (SIOP), to the real policy question of the acceptability of the use of nuclear weapons is highly questionable.

Arguments which seek to support the relevance of nuclear deterrence have assumed that in the post-war bipolar relationship, Soviet deterrence strategy mirrored its American counterpart. This was not so. The differing philosophical rationales for the pursuit of deterrence have already been alluded to. Similarly, Soviet attitudes towards nuclear weapons themselves were also significantly different.

In the Soviet case, too, nuclear weapons played an important role in its foreign and defence policies, primarily because possession of these weapons was a vehicle for its claim to superpower status. Nevertheless, there is

evidence that early on the role and status of nuclear weapons in Soviet political doctrine was limited (36). These weapons were not seen as means of pursuing political ends, but rather just another integral part of the Soviet military's combined arms operations (37). At a time when the Kennedy Administration was moving to embrace the political deterrence of Mutual Assured Destruction, Sokolovsky's classic Military Strategy, which first appeared publicly in 1962, spelled out the USSR's continued willingness to fight a nuclear war and win (38).

Khrushchev's subsequent efforts to downsize the Soviet armed forces in the early 1960s mirrored Eisenhower's policies of a decade earlier. These efforts, as McGwire suggested, led to an increased dependence on nuclear weapons, and a resulting shift away from a nuclear war-fighting capability to massive retaliation as the best means of deterring its major antagonist (39). This increased dependence, however, had at the same time, made these weapons, as Eisenhower and Kennedy had already discovered, unusable. It was therefore inevitable that by the beginning of the 1970s, the Brezhnev regime should resign itself to the reality of MAD. The deterrence doctrines of the two superpowers therefore converged temporarily in the mid-1970s.

It is not surprising, as a result, that this particular period should also be associated with effective nuclear arms control efforts. The conjunction of a mutual desire for an

effective regime for the control and management of nuclear weapons, the compatibility of their respective nuclear deterrence doctrines, and a rough parity in strategic force levels between the superpowers created the environment necessary for negotiations aimed at their limitation and reduction.

There is no reason to suggest, however, in examining international relations in the post-war Cold War period, that nuclear deterrence had significant success in preventing interstate conflict generally. Conventional conflicts in this period were not effectively deterred because the bi-polar nuclear stand-off prevented their escalation to the nuclear level, and therefore costs were still seen to be sufficiently bearable, particularly by non-nuclear players as events in the Mid-East over the years have shown (40). Iraq's Saddam Hussein was just one of a long line of Middle Eastern rulers who presumed the East-West stand-off left him free to dabble in regional power politics. His mistake lay in not realizing that the Cold War was over. Even then, however, both sides in the Gulf War deliberately rejected the nuclear option (41).

Nuclear arsenals appear, conversely, to have often restrained or frustrated the national policies or strategies of their owners, rather than enhancing their ability to achieve their desired goals. George and Smoke have pointed out that ultimately, deterrence is also a policy which, if it succeeds, can only frustrate an opponent who desires to

change the status quo (42). Moreover, regardless of any residual attraction to nuclear weapons which may linger for nations seeking a source of national prestige, the experience of the superpowers has demonstrated their severe practical limitations for extended deterrence or the deterrence of conventional aggression.

The realization of the inutility of nuclear arms as weapons of war or tools of peace was slow to dawn on both political and military leaders in the US and USSR, but learning appears nevertheless to have occurred as the gradual shift away from a monolithic dependence on nuclear deterrence to the search for other means to regulate their relationship unfolded over the first two decades of the post-war era. The influence of the growing phenomenon of a pluralist cooperative approach to state interaction and conflict which was the dominant characterization of the post-Vietnam War period of detente, was instrumental in offering a way out of the nuclear deterrence conundrum. Cooperation, rather than confrontation was to form the basis for the new emphasis placed on nuclear arms control in superpower relations which came to dominate the subsequent two decades.

CHAPTER THREE

ARMS CONTROL TO THE RESCUE?

The perceived need to control arms or limit the capacity for the use of military force is not new. Governments or societies have long sought to limit the military threat posed by an opponent through measured restraint in the development or maintenance of a military capacity as an alternative to the unregulated application of deterrence, or the prosecution of war as a result of deterrence failure. The Athenian orator Demosthenes, for example, chronicled one of the earliest efforts in this regard in the third century B.C. in the negotiations between Macedonia and Athens which were aimed at stemming their drift toward war (1). That these negotiations ultimately failed and war resulted misses the point that both sides had indicated an initial preference for seeking ways to regulate their competition short of military conflict.

Specific measures to control military capability can take a variety of forms, which Burns grouped into three general categories; retributive in nature (extermination of the vanquished or the imposition of the victor's terms), unilateral (passive unilateral neglect or active unilateral decision), or reciprocal (bilateral or multilateral understandings or agreements) (2). The first category is directly linked to the use of force. The latter two are, by comparison, explicit alternatives to the use of force. The

strategic nuclear relationship between the superpowers was one combining both unilateral and reciprocal measures over the years. Unilateral measures were long favoured by conservative realist decision-makers and military officials on both sides as being those which were least restrictive on the pursuit of national goals and objectives, one of which was of course international stability. Nevertheless, unilateral measures can only successfully achieve this goal when reciprocated or acknowledged by an adversary.

More liberal or pluralist elements in both societies, having perceived the potential value of collective interdependence and collective action, emphasized on the other hand the merits of mutually agreed reciprocal measures in achieving these goals and objectives. Their rationale pointed to such practices as a means of avoiding the possibility of misunderstanding which could result from unilateral actions by one side or the other. While recognizing the utility of certain unilateral measures in signalling a commitment to arms control to an adversary (3), the overwhelming need for effective guarantees of stability in their nuclear relationship, the limitations offered by unilateralism in achieving such guarantees, and the political imperative of openly demonstrating a mutual commitment to world peace and security to their respective publics and allies through active engagement of the adversary drove American and Soviet political leaders to embrace reciprocal arms control measures, such as the SALT-

START negotiating process of the last two decades, as the more productive of the two options. The eventual acquiescence, albeit more reluctantly, of military officials and strategists in both countries to this apparent rejection of traditional realist prescriptions in favour of a more pluralistic approach to superpower relations seems to confirm the validity of this observation.

Mutually agreed efforts to limit the possibility of military conflict have throughout history included attempts to establish rules for the conduct of war, ranging from the conditions for a "just war" set out by medieval Christian theologians such as Aquinas (4), to modern day multilateral agreements banning the use of certain inhumane or barbaric weapons (5). The utility of ensuring adequate communication and administrative procedures between adversaries has been another accepted form of arms control, as in the conferring of diplomatic immunity to protect emissaries and negotiators, or the tacit understanding between the US and USSR not to interfere with each other satellite surveillance capabilities (6).

Specific geographical arms limitations, such as the 1817 Rush-Bagot Treaty which de-militarized the Great Lakes, have been pursued (7). Limited qualitative and quantitative arms reduction agreements, while less numerous than other forms of arms control, have also been achieved, such as the 1890 Brussels Act which prohibited "the introduction into Africa ... of firearms and ammunition other than flintlock

guns and gunpowder, except under effective guarantees (8)" and the 1924 Convention on the Limitation of Armaments of Central American States (9). The 1990 agreement to reduce conventional armaments from the Atlantic to the Urals is the latest example of such efforts (10).

The actual "controlling" or limitation of arms or their use through negotiated agreements as a valid alternative to disarmament, i.e. their complete elimination per se, is nevertheless a phenomenon which has become widely accepted only in the present century, and more specifically, during its latter half. Since World War II, arms control has been a new departure from the liberalist disarmament movements which dominated earlier periods. Traditional disarmament efforts have been characterized by their virulent anti-militarism and their "all-or-nothing" approach to arms reductions (also primary components in the unadulterated lack of success of such efforts to date).

Arms control, by comparison, has been stimulated in particular by the post-war flowering of operational research, analytical thinking and by the application of new logic to military problems. This new thinking on the relationship between arms, stability, and conflict has been enhanced by two factors:

- (a) the continuity staying power of realism and the perception that disarmament enforced only by the questionable legal sanction of international treaties had not worked in the past; and,

- (b) the advent of nuclear weapons, armaments too terrible for their unrestricted use to be contemplated.

Arms control has thus developed over the past four decades into a sophisticated policy prescription designed to reduce the likelihood and/or consequences of war through measures based upon both national self-interest and international mutual interest, taking account of psychological perceptions and political and economic environments. It has been an attempt to link the technology of nuclear weapons with the politics of the Cold War.

Nevertheless, despite its historical precedents and the widespread acceptance of the term into the everyday post-war lexicon, Kissinger's comparison of arms control to Lord Palmerston's description of the arcane issue of Schleswig-Holstein in the 19th century underlines the reality that arms control often remains misunderstood and seemingly beyond the grasp of all but the most sophisticated of observers (11). Such misunderstanding and misperception has in turn played a major role in the perceived success or failure of contemporary arms control efforts, among them the SALT process. One might attribute such difficulties of comprehension to the increasing complexity of modern day arms control issues and negotiations. It would be equally accurate, however, to attribute this misunderstanding to a general ignorance of the fundamental nature and rationale for arms control. Arms control is not disarmament (although arms reductions may be one result from the process). This

misapprehension in turn has had a significant impact on the approaches adopted by decision-makers towards arms control which, to complete the vicious circle, ultimately influence the outcome of the endeavour.

In attempting to define what arms control is, Intriligator and Brito perceived an evolution in thinking on the issue during the post-war period which has roughly corresponded, interestingly enough, with the evolution of post-war deterrence theory and practice (12). While this can be regarded as a positive development from a theoretical perspective, this shift has, no doubt, at the same time added to the confusion about what arms control is all about exactly, and whether or not it has proven useful in international relations. For Intriligator and Brito, the image of arms control in the years immediately following the Second World War was largely synonymous with that of disarmament. Arms control was viewed by national decision-makers and the public alike primarily in terms of quantitative reductions in the numbers of arms, if not their complete elimination, particularly with regard to weapons of mass destruction such as nuclear weapons and chemical and biological arms. The Baruch Plan and other alternatives of the late 1940s aimed at the total elimination of atomic weapons can be considered examples (13). Post-war arms control efforts of this form fell victim to the resistance of national military leaders enamoured of the new power offered by the splitting of the atom, and the political

imperatives of the Cold War. Arms control at this juncture was largely driven, to the degree it was driven at all, by the imperative of war aversion, with little attention being devoted to the impact of such initiatives on national security. Thus, little support or interest was generated within the military or strategic analysis community.

Attention shifted by the 1960s to an emphasis on reducing the risk of war, particular nuclear war, rather than necessarily reducing weaponry. Arms control became concerned not just with levels of armaments, but also with the qualitative nature of these armaments in terms of their effect on strategic stability, with increasing weight being given to the latter as successive quantitative disarmament initiatives failed. In this context, Schelling and Halperin came to define arms control during this period as;

"essentially a means of supplementing unilateral military strategy by some kind of collaboration with the countries that are potential enemies. The aims of arms control and national military strategy should be substantially the same (14)."

In other words, political and military priorities should march in lock step towards the realization of national goals and objectives. While this may not appear to be a thundering revelation, the fact that Schelling and Halperin felt that it had to be stated indicated the degree to which they believed this fundamental truism had been forgotten in arms control efforts to date. The inherent synergism of arms control and deterrence began to clearly emerge during

this period, and it is not coincidental that it coincided with Quester's "golden age" of deterrence theory.

Bowie noted that:

"the concept of arms control includes any agreement among several powers to regulate some aspect of their military capability or potential. The arrangement may apply to the location, amount, readiness, or types of military forces, weapons, or facilities (15)."

These perspectives were unique in their recognition that military relationships with potential adversaries, while containing strong measures of conflict and opposition, also included aspects of mutual interest, such as the avoidance of war and the protection of assets. The Hot Line Agreement of June, 1963, signed in the wake of the Cuban Missile Crisis of the previous October, was perhaps one of the first reflections of this new interest in ensuring stability at the strategic nuclear level by means which did not necessarily envisage arms reductions (16). Moreover, it was deemed a successful undertaking in that it addressed both political and military goals.

A third and, at the time of their writing, final post-war shift in arms control, according to Intriligator and Brito, followed with the institutionalization of the bilateral negotiating process between the two superpowers concerning their strategic nuclear arsenals, which in the view of these observers narrowed the concept in the eyes of the general public to strictly those bilaterally-negotiated agreements achieved at the superpower level (17).

Furthermore, continued public preoccupation with quantitative reductions remained a predominant feature in measuring the success or failure of negotiations. This definition they regarded as too restrictive in that it did not take account of the potential of non-superpower, non-nuclear, multilateral, or even unilateral arms control measures. Their views have been borne out in the successful conclusion of the multilateral Conventional Forces in Europe Treaty signed in 1990, and the more recent Bush/Gorbachev-Yeltsin nuclear initiatives.

The general unique association of arms control with superpower strategic arms negotiations also risked demeaning or damaging the concept if superpower agreements concerning their strategic nuclear forces were to be regarded as largely meaningless or minimal. This was indeed the case with regard to SALT II, and was also reflected in the initial public reaction to the 1991 START agreement. The latter was a nine-year negotiating process which many saw as overtaken by the radical political changes of the past two years. In light of the recent disintegration of the USSR, the START agreement is now being seen as one means of effectively imposing limitations or controls on the nuclear arsenals inherited by the newly-independent republics. The success of recent bilateral and multilateral arms control negotiations would suggest a fourth shift in post-war arms control, symbolizing the institutionalization of the negotiating process into the multilateral, non-superpower,

and non-nuclear spheres, and more importantly, its acceptance by the general public as an important contribution to international peace and security even if the elimination of large numbers of weapons does not immediately result.

Despite evidence of obvious collectivist pluralist elements in the post-war arms control framework, which is heavily dependent upon the construction of an effective regime environment (18), there remains an unavoidable relationship between arms control and military strategy which essentially validates the definition offered by Schelling, Halperin, and their contemporaries. While disarmament measures seek to reduce the role of military strategy in national decision-making and the use of force in the international arena, arms control in reality merely attempts to stabilize the environment in which such strategy is applied. Here, as suggested earlier, arms control can be viewed as interacting with and enhancing deterrence. Arms control might in this context be a version of the "strategy of reassurance" articulated by Lebow and Stein (19).

Arms control also recognizes, however, that while national leaders ostensibly exert political control over their respective military establishments, the military establishments of adversaries will nevertheless affect each side's perceptions and actions, even at the political level. It should be natural therefore for arms control measures to be primarily concerned with things military and to attempt

to exert some kind of restraining effect on the military forces concerned. Purely political considerations should in these circumstances be seen as secondary and a by-product of military considerations affecting national stability and security.

Disarmament, on the other hand, implies a withering of the importance of the military in national policy considerations, thus implying that it is an inherently political activity. This separation is, however, somewhat simplistic and artificial, intimating that arms control and disarmament cannot be complementary, which was certainly not demonstrated by the 1987 agreement on intermediate-range nuclear forces which eliminated an entire category of nuclear weapons systems that both the US and USSR saw as undermining the military security, and hence the political stability, of their respective spheres of influence in Europe (20).

The real differentiation between arms control and disarmament hinges upon which concept functions best in the present international environment. The notion of arms control described above is best equipped for integration into realist prescriptions for the pursuit of international relations which have dominated the Westphalian epoque in international relations. The predominance of realism in turn emphasizes arms control's military influences. As pointed out, this is particularly the case with Burns' "unilateral" arms control undertakings in which a nation

takes an action it deems most satisfactory to its self-interest.

At the same time, arms control's pluralist roots nevertheless exert considerable influence. It is inevitable, for example, that through repetition and/or reciprocation unilateral measures can become institutionalized in some way, either unilaterally, bilaterally or multilaterally. The relationship between adversaries can become routinized, therefore more predictable, and less threatening.

The compatibility of arms control with theories of cooperative regime formation espoused by the pluralist school is evident in Edwards' description of arms control as "unilateral and multilateral measures that are designed to restrain the military establishment of a nation or nations through national interaction (21)." A regime is generally accepted to describe a set of governing arrangements which regularize behaviour and control the effects of national actions by creating a more predictable international environment (22). The multilateral nuclear non-proliferation regime is a good example (23).

Arms control, therefore, is the hybrid off-spring of both the realist and pluralist paradigms of international relations, retaining many of the features of each. It can be argued, for example, that arms control artificially prolonged the bi-polar confrontation between East and West, that it was used by the superpowers to consolidate their

nuclear superiority, and that it accorded undue importance to the policy of deterrence far beyond that which the latter deserved.

Conversely, the emergence of arms control in the late 1960s can be viewed as an alternative mechanism to realism for managing the superpower strategic nuclear relationship. Its subsequent institutionalization through the bilateral negotiations which took place during the past two decades, the resulting growth in its popularity, and its expansion into other areas of East-West military and political rivalry demonstrate a shift away from the realist emphasis on confrontation, unilateral action, the application of deterrence, and the use of military power to a more cooperative interdependent approach to the superpower relationship, based more on political considerations both domestic and international. No other area of the superpower bilateral relationship so clearly demonstrated this paradigmatic or perceptual dichotomy than the strategic arms control arena.

In practice, arms control's ideological origins are less important than its intended aims and objectives. This is particularly so in any analysis of the success or failure of recent arms control negotiations. The issue of shared beliefs, agreed standards of behaviour and the application of specific prescriptions or proscriptions by parties attempting to construct a pluralist regime in a realist environment is significant when discussing these aims and

objectives. This, after all, lies at the crux of the debate about the relative importance of quantity versus quality in strategic nuclear arms control efforts. The three most frequently cited generic goals of the arms control process are;

- (a) to make the outbreak of war less likely;
- (b) to decrease the probable damage should war occur; and,
- (c) to lessen the peacetime cost of preparing for war (24).

Are these goals best accomplished by quantitative reductions in nuclear arms or qualitative limits on these arms? The inherent relationship between the prevention and prosecution of war alluded to in the above criteria is an interesting one in grappling with this question at the nuclear level. While the concept of arms control does incorporate much of the pluralist emphasis on cooperation and interdependence, resulting in an apparent redundancy in the need to maintain large forces (i.e. the desirability of quantitative reductions), at the same time, however, the relationship between arms control and realism, with its continued reliance on military strength, is also revealed in these criteria. Arms control, unlike disarmament, is seen as enhancing national and international security by recognizing the continued utility of military power in the modern world. Thus the concept, while containing the pluralist elements of regime theory noted above, also retains significant realist priorities. This fusion of the

two paradigms is the main source of the discord embodied in arms control's quantitative/qualitative debate.

While proponents of disarmament regard the existence of weapons as the cause of arms races and wars, arms controllers believe there is no simple cause and effect relationship between the possession of weapons and the outbreak of war. In their view, wars begin in the minds of human beings, not in the barrels of guns, and that peace and stability are as much a function of intentions as they are of military capabilities (although the latter can often give an accurate indication of the former).

Crucial to this line of thinking is the fact that arms control measures may involve reductions in levels of armaments, but not necessarily so. In fact, observers such as King have labelled the view that disarmament in and of itself can be a panacea for the ills of the world a "tragic illusion, if not a deliberate fraud (25)." If nations are prepared to accept the consequences of war, so this line of thinking goes, they will find the means and rationale to do so. Thus, the objective of the arms controller should be to deal with those factors which prompt states to go to war. These factors are largely the result of misunderstandings about the intentions of a potential adversary, fear of the political situation generating beyond control, and anxiety about the impact of certain weapons systems on this deterioration.

Arms control therefore attempts to achieve an international environment in which a stable balance of political power exists because neither side is encouraged to take advantage of a perceived military weakness on the part of the other. One of the main criticisms of the 1987 INF agreement, which was trumpeted at the time as the first nuclear weapons "disarmament" agreement in history, was that it in fact promoted instability by reducing the flexibility of NATO's flexible response strategy.

An effective arms control regime will therefore specifically address such factors as:

- (a) the comprehensiveness of the measures to be undertaken (singular or compound measures);
- (b) their specific nature or target (relevant provisions, such as weapons, soldiers, budgets, deployment, usage);
- (c) the degree or nature of the changes (reduction, increase, alteration);
- (d) their magnitude or scale (large or small);
- (e) their general aims (unilateral, self-sufficing, unilateral reciprocating-inducing, bilateral, multilateral);
- (f) degree of publicity (tacit or explicit, open or secret);
- (g) overall objectives (no war, curtailed war, non-war side effects); and,
- (h) elements (administration, inspection, verification, adjudication, control, ratification, alteration, extension and termination) (26).

Note that numerical limitations or reductions play only a minor role in this framework. The overall goal is not reductions themselves, but increased stability and security.

This does not however imply a resolution of the issue of quantity versus quality as the overall goal of arms control negotiations. The three generic goals for arms

control of reducing the likelihood, consequences, and preparation costs of war must be further dissected into military, political, and economic components to consider their inter-relationship. Here, the debate between quantitative and qualitative arms control measures as the best solution to the nation's security needs is most clearly evident. The primary military objectives of arms control are to constrain the external threat, minimize the uncertainties which lead to war, and minimize the number of independent threats (27). Politically, on the other hand, national leaders aim at achieving better relations with an adversary, sustaining the process of negotiation and the development of confidence and security-building measures, and reassuring their respective publics. The last of these three can even overshadow the former, particularly in democratic societies where it can be directly associated with a government's electoral popularity. Finally, there is the overall economic imperative of managing defence expenditures generally, and evading the costs of an arms race specifically.

This more detailed analysis reveals that, while ideally all three sub-components should be complementary, the potential nevertheless exists for disharmony among these various objectives. Much of this disharmony is often the result of an incompatibility in the domestic and foreign policy priorities of states, and the inherent antagonisms introduced by bureaucratic politics. This in turn can have

a significant impact on the success or failure of arms control negotiations. The ultimate goal of the arms control process may be stability, but a differentiation must be made between political, or strategic stability, as Nye has labelled it, military or crisis stability, and arms race or economic stability (28). Figure 3.1 introduces the model of an arms control triangle incorporating each of Nye's three determinants. Nye saw ideal arms control initiatives as addressing all three aspects equally (Figure 3.2).

Fig. 3.1: The three main aspects of the arms control triangle.

Fig. 3.2: The "equilibrium point" denoting effective arms control.

In reality this is virtually impossible, given the competing interests of a pluralistic, often disharmonious national decision-making process (29).

The military objectives of arms control may in fact result in increased defence spending and increased public concerns, for example. Political arms control objectives may increase public comfort, but decrease military security. Economic arms control objectives may meet some political arms control concerns but undermine military arms control priorities. Given these competing domestic and international priorities, the issue becomes one of where does the pragmatist place his or her emphasis in pursuing

arms control. Too much attention to domestic concerns can result in incompatibility at the negotiating table, as shown during the early years of the START negotiations (30). Too much attention to the achievement of compatibility at the negotiating table may ignore competing domestic interests, as indicated in the abortive 1985 "walk in the woods" by Soviet and American INF negotiators (31). Establishing an arms control proposal which achieves the equilibrium point indicated in Figure 3.2 means surmounting the competing priorities of the military, political, and economic components, and their relative emphases on quantitative or qualitative limitations. As Caldwell, Talbott, Garthoff, and numerous others have demonstrated, however, the in-house process of brokering a particular arms control proposal or national position on arms control prior to its unveiling in an international negotiating forum is often the most difficult aspect of the process (32). Objectivity can easily fall victim to subjectivity.

Ultimately, arms control deals with military capability. Schelling and Halperin underlined the fact that military forces are not maintained simply to win wars (33). If this were so, quantity of forces would be the overriding determinant, arms races would predominate, and arms control would be virtually impossible. Such forces, if structured properly on the other hand, can by their very existence help avoid false alarms and misunderstandings between nations. These forces can moreover deter aggression without recourse

to the kinds of threats which provoke desperate actions on the part of an opponent. While they may have been referring to all types of military forces in their analysis, it is not surprising that the revelations of Schelling and Halperin are particularly relevant to nuclear forces. One can see how the existence of nuclear weapons has moved to shape such thinking on the utility of armed force. The chief aim of a nation's military forces is no longer their role in the use of force to achieve one's goals and objectives, but rather their role in ensuring its non-use. Only nuclear weapons are powerful enough to ensure that the cost outweighs the benefits of military action.

From a purely military or crisis stability perspective, stability implies there is no incentive on the part of nations to pre-empt an anticipated attack by one upon the other. Pre-emption becomes a desirable option for a nation if it considers its own military posture vulnerable. Vulnerability was the main motivation for imperial Germany's decision to initiate the First World War (34). Vulnerability can be reduced by making these forces more survivable. Schelling suggested a number of measures which could enhance survivability, including the introduction of redundancy and diversification of forces, along with qualitative, rather than quantitative improvements (35). From a military/crisis stability standpoint, it would seem rational that arms control should attempt to accomplish these goals either formally and collectively, through such

efforts as the USA's insistence throughout the START negotiations that the USSR engage in a discussion about a mutual and balanced transition to a greater dependence on defence in the strategic equation (36), or informally and unilaterally, such as the informal provision of technical information on permissive action links by the United States to the Soviet Union in the 1960s (37). Had the other powers in pre-World War I Europe been similarly sensitive to German crisis stability concerns, the conflagration of 1914-18 may have been avoided. In military/crisis stability considerations, therefore, quality becomes the determinant criteria for nuclear arms control policy.

The utility of nuclear weapons as tools for the traditional pursuit of national goals and objectives is, as pointed out previously, nevertheless highly limited. What usefulness they may have provided as a deterrent is reduced to a very narrow band of the threat/conflict spectrum. At best, they merely deter other nuclear weapons. Even in this context, however, the value of these weapons is a function of the benefits to be derived compared with the costs likely to be incurred by their use or threat of use. As such costs, politically, economically, and militarily are potentially so high, few if any decision-makers can seriously contemplate their use, no matter how desperate the situation. The inability of NATO leaders to agree on permanent guidelines for the use of the Alliance nuclear

stockpile in time of war for nearly two decades provides a stark example (38).

With this in mind, it is apparent that arms control objectives from a political or strategic stability perspective may be different from their military counterparts. Intriligator and Brito identified a number of political aspects as secondary concerns which orbit about the three central arms control aims laid down by Schelling and Halperin, including;

- (a) the reduction of tensions and the development of confidence-building measures;
- (b) the promotion of strategic and military objectives;
- (c) the promotion of international political objectives;
- (d) the promotion of domestic interests or the alteration of the domestic climate;
- (e) the alteration of the perceptions of adversaries; and,
- (f) the strengthening of one's own alliance and the weakening of the opponent's (39).

Despite the secondary importance attached by the military or defence community to these political aspects, tacit or written rules for the prevention and management of a political relationship can be just as important, if not more so, than the technical characteristics of particular weapons. The process of merely talking to the other side can be of overriding significance. The main goal here would be to prevent major changes in the policy or actions of a rival nation which, intended or unintended, could have a coercive effect. In the words of a Western diplomat to the 17-year Mutual and Balanced Force Reduction (MBFR) talks in

Vienna, the goal of the exercise was not the final destination, but the journey itself (40).

The effects of arms control negotiations on relations with third parties also becomes important as both superpowers discovered in terms of their relations with allies during the course of their bilateral nuclear negotiations over the years, most notably evident in the furor within the Western Alliance resulting from the discussions at the US-Soviet Reykjavik Summit in 1986 (41).

Finally, public perceptions of the goals and objectives of arms control influence the political/strategic stability factor. This influence is reflected in an emphasis on quantitative arms reductions as the best means of achieving political goals. In all of these considerations, but most notably with regard to public perceptions, the qualitative component of arms control is subordinate to the perception that greater security can be derived from the presence of fewer arms. The public's misassociation of arms control with disarmament is a critical factor. As a major arms control agreement reaches fruition, or conversely as negotiations drag on interminably, public pressure for a successful resolution (i.e. reductions in armaments) can induce political leaders to make last minute or ill-considered compromises which may make sense from a political/strategic standpoint but ultimately undermine military/crisis stability (42). This is a natural phenomenon insofar as the public's grasp of arms control

issues is often reduced to quantitative comparisons of numbers of weapons on both sides rather than qualitative or non-hardware considerations. One of the conclusions to be drawn therefore is that military and political arms control objectives may not always be consonant when the former focusses on uniquely qualitative considerations while the latter emphasizes quantitative concerns. This may therefore pose a major problem for political and military leaders in terms of their respective perceptions of the adequacy of the outcome in addressing the issue of "stability".

Arms race or economic stability, as defined by Nye, "refers to the absence of incentive for either side to expand rapidly or improve its arsenal (43)." This arms race aspect is notable for its emphasis on the two-player or multi-player competitive process which is a function of the reaction to both technological advances which affect weapons system development and also procurement decisions influencing numerical developments in the force structures of rival states. Given the extremely long lead times involved in the research, development, testing, production, and deployment of modern weapons systems, the action-reaction phenomenon often articulated when describing arms races becomes one of "anticipated" action-reaction, with each nation attempting to peer into the fog of the future to predict what the other's successive weapons development programmes will be. The implication of this is an image of a never-ending game of one-upmanship in which each side

to outwit, outspend, and out-build the other. The arms race aspect of this third component of arms control can be equally supportive therefore of both the quantitative and qualitative approaches.

Given the fact that the resources available for spending on defence are not unlimited, adversaries such as the US and USSR, while seeking to match the other side's military capability, must nevertheless remain conscious of the related costs. No arms spiral is either limitless or uncontrolled in this regard. Governments are primarily concerned with getting "the best bang for the buck" or "the most rubble for the rouble." They must be conscious that public support for huge defence budgets during periods of protracted peace is especially suspect. These economic considerations can also influence both quantitative and qualitative aspects of arms control, but only so far as to favour one approach over the other. The US, for example, enamoured with its own technological prowess, has probably favoured investment in qualitative improvements in its nuclear arsenal as the most economically effective means of ensuring its security. The USSR on the other hand traditionally favoured the rapid production of large numbers of less sophisticated nuclear systems as the most cost effective solution (44). These perceptions, as a result, should logically have affected the approaches these nations adopted towards strategic nuclear arms control at the

negotiating table and directly influenced the consequent outcome.

All of these considerations can be summarized by posing two questions which all adversarial nations must address in considering the alternative of arms control. First, what factors have prompted arms control efforts in the past? And second, what risks and dangers, hopes and expectations do these past attempts at arms control suggest for future efforts? The perceived answers to these questions will in turn influence the way nations will approach arms control and the type of undertaking which will be attempted. In terms of nuclear arms control, the existence of such weaponry and the reality of strategic parity largely eliminated the possibility for retributive arms control measures by either side. Similarly, the competitive and mutually suspicious nature of the superpower post-war relationship severely limited options for significant unilateral arms control initiatives. Thus, the history of nuclear arms control efforts by the superpowers through sheer process of elimination centered around reciprocal arrangements agreed to as a result of painstaking negotiations on those weapons regarded as the greatest threat to national security.

Not surprisingly, the focus of superpower nuclear arms control was therefore been fixed upon the strategic sphere as these weapons were the sole military means by which the territorial integrity and existence of each country could be

threatened. The history of these negotiations was as a result dominated by the military's qualitative preoccupation with the safety, security, survivability of its own strategic assets, and those of the adversary. This encompassed recognition of the desirability of an on-going, open-ended exchange of views aimed at improving crisis stability through increased confidence and predictability, while concurrently pursuing the qualitative development of new weapons systems. This was accompanied by a concurrent political discussion, driven largely by domestic considerations, which tended to focus on the quantitative balance of forces and the necessity of force reductions as the best means of enhancing strategic (i.e. international) stability. Finally, throughout the process, economic considerations largely based on the pervasive fear of a two-player arms race or loss of perceived advantage encouraged both sides to adopt the negotiating process as a means of reducing military expenditures and enhancing arms race stability by exercising some constraint on unrestricted growth in their strategic forces. This economic/arms race aspect of the stability equation was largely perceived in quantitative terms - fewer weapons meant lower costs.

The substance of the negotiating process, i.e. what is to be negotiated, is important, but so are the methods, procedures and characteristics of the process itself. Edwards, for example, discerned two main types of negotiations (45). Cooperation negotiation occurs when the

objective is shared and cooperation is required for its attainment. Alternately, bargaining negotiation takes place when objectives are not shared, but each side can offer something desired by the other. In the case of the strategic arms control negotiations between the superpowers, it can be argued that military/crisis stability objectives fit the first category, while political/strategic stability objectives were more consistent with the second.

Furthermore, while military stability objectives remained consistent over time, political stability objectives of strategic nuclear arms control varied with the vagaries of domestic politics, the bilateral relationship, and the international climate. Finally, economic/arms race stability considerations were applicable to both the political and military aspects, and thus consistent with both cooperation negotiation and its bargaining equivalent. The desire to maintain control over strategic arms expenditures was tempered with the unknowns associated with technological development and the potential effect of this development on stability.

All of these factors ultimately influence the nature of the arms control measures which are deemed to be desirable by parties entering into reciprocal arrangements or a negotiating process (46). Military/crisis, political/strategic and economic/arms race stability considerations can introduce opportunities or impose restrictions on the desire or the ability of the parties to

negotiate measures in any or all of these areas. The emphasis that a nation gives to each of the three primary areas of stability (military/crisis, political/strategic, or economic/arms race) will dictate its priorities entering into arms control discussions with an adversary.

Using Nye's three military, political, and economic determinants as guidelines, the following chapter will attempt to illustrate the dynamics of the contemporary arms control process in examining the SALT II negotiations. While the SALT II process should have ideally sought the arms control triangle's equilibrium point, national preoccupation with or preference for one form of stability or another will show how the balance may be upset, thus influencing the direction, length, and final outcome of the negotiations. The degree of compatibility in the negotiating approaches of the parties will dictate whether the negotiations will be cooperative or involve bargaining, and determine their eventual success or failure. Finally, these dynamics are also mirrored at the domestic level in the intra-governmental negotiating process in which each nation's negotiating position is hammered out before being presented to the other side, an aspect which, although not directly addressed in the analysis of the SALT II negotiations, has nevertheless been tacitly acknowledged in the preceding discussion of arms control priorities and objectives.

Each side brought all of this intellectual and physical baggage to the SALT II negotiating table. Thus the complexity of that and other arms control negotiating processes begins to be more clearly understood. It is much more than mere bean-counting or a question of how much is to be cut and where. Each participant not only negotiates with its adversary in an effort to enhance international stability and mutual security, but also with itself in terms of determining the best method for achieving national aims and gaining comparative advantage bearing in mind these military, political and economic desirables. Whether these objectives are seen to be best gained by quantitative or qualitative arms control initiatives was the crux of the SALT II process.

CHAPTER FOUR

ARMS CONTROL, STABILITY AND SALT II

SALT I 1969-72: The Prelude

The SALT I Agreement signed at the first Nixon-Brezhnev summit in Moscow on May 26, 1972, created the environment in which was to shape the nature of the SALT II negotiations which followed. The "agreement" was more accurately a cluster of four inter-linked treaties and understandings comprising:

- (a) The Agreement on Measures to Reduce the Risk of the Outbreak of Nuclear War Between the United States of America and the Union of Soviet Socialist Republics (also known as the Accidental Measures Agreement);
- (b) The Agreement Between the United States of America and the Union of Soviet Socialist Republics on Measures to Improve the US-USSR Direct Communications Link (also known as the Revised Hot Line Agreement);
- (c) The Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation and Deployment of Anti-Ballistic Missile Systems (also known as the ABM Treaty); and,
- (d) The Interim Agreement Between the United States of America and the Union of Soviet Socialist Republics on Certain Measures with respect the Limitation of Strategic Offensive Arms (also known as the Interim Agreement) (1).

While the direct product of seven successive negotiating sessions alternating between Helsinki and Vienna over a period of two and one-half years, SALT I's unofficial history stretched back over the previous two decades.

The deadlock which emerged as a result of superpower intransigence on the issue of sweeping nuclear disarmament proposals such as the Baruch Plan and the McCloy-Zorin

Principles (2) led to an important philosophical shift which is best described as a new appreciation that the principle of general disarmament should give way to efforts to control or limit developments in the nuclear sphere which could increase instability and lead to war. The notion of arms control emerged as an attempt to slow down rather than stop the perceived bilateral nuclear competition between the US and USSR - to enable the superpowers to walk rather than run a nuclear arms race - while multilateral efforts at "general and complete" disarmament continued. While meeting political objectives of tension reduction and active engagement of the adversary, this new approach was also compatible with the concerns of military strategists on both sides of the need to ensure that existing nuclear capabilities would not be undermined by crises provoked by unanticipated or undesirable developments. It also held the potential for substantial economic benefits given the decisions by both Eisenhower and Khrushchev to give predominance to nuclear forces in national defence policy and strategy as a means of reducing expenditures on conventional forces. The limiting of these nuclear forces, therefore, could result in further direct savings.

This functionalist approach, concentrating on small or even symbolic beginnings which could enhance security by building mutual confidence was reflected in a series of peripheral proposals emanating from both sides in the late 1950s in such areas as nuclear testing and verification (3).

While most were unsuccessful, there was nevertheless a discernable knitting together of the two major nuclear antagonists into a network of arms control undertakings which institutionalized government functions at both the domestic and international levels concurrently, leading to a greater focus on and a greater desire for more substantive arms control possibilities.

The main catalyst which stimulated bilateral nuclear arms control at the superpower level was the October 1962, Cuban Missile Crisis. No one incident has brought the two closer to nuclear war (4). As a result of the crisis, both superpowers realized the necessity of bilateral cooperation in mutually managing their nuclear relationship as the most effective means of meeting national goals for stability and security. Unilateral actions by both sides during the crisis had caused confusion, misunderstanding, and an escalation rather than a reduction in tensions (5). Above all there was a recognition of the need for effective communications to prevent a nuclear exchange, along with measures which could build confidence without necessarily limiting force capabilities and postures. The Hot Line Agreement and Limited Test Ban Treaty of 1963 (LTBT) were direct results and precursors to the strategic arms limitation negotiations which were to follow (6).

These agreements, which did not address the issue of nuclear arms per se, were regarded by some, such as US Secretary of State Rusk as important breakthroughs which

would "slow the upward spiralling arms race without damaging the relative strength of either side (7)." Critics, such as Epstein, on the other hand, recognized that the agreement neither impeded the development of new weapons by the superpowers nor prevented other parties from following suit (8). The accords thus handsomely addressed military/crisis criteria (i.e. survivability of forces, increased early warning), responded to political strategic concerns marginally (i.e. normalization of relations), but ignored economic/arms race aspects associated with a robust arms control achievement according to Nye's criteria (Figure 4.1). Their utility must therefore be considered a limited response to an immediate crisis and exerting minimal influence on superpower nuclear arsenals overall.

In January 1964, the US proposed that obsolete strategic bombers should be eliminated by both sides and that the two countries "explore a verified freeze" on strategic offensive and defensive arms (9). Given the technological and numerical superiority of the US at the strategic level at this time and the utter lack of Soviet motivation militarily or politically in these proposals despite the possible economic benefits of a freeze, it is not difficult to understand why they were non-starters (10).

Despite the progress achieved in the 1960s in using arms control to enhance military/crisis and political/strategic stability, the prime stimulus for the SALT I negotiations was, ironically, economic/arms race in

nature. In the mid-1960s, the desire to reach agreement on nuclear arms control was critically influenced, on the US side, by concern about Soviet development of an anti-ballistic missile (ABM) system. Until this point, the Johnson Administration had resisted the need for ABMs for cost effectiveness and military/crisis stability reasons,

Fig. 4.1: The arms control priorities of the 1963 Hot Line and LTBT agmts.

Fig. 4.2: US motives in proposing controls on ABM systems.

despite having a technological advantage over the Soviets in this field (11). With the deployment of the Soviet system, the US was, however, faced with the choice of either deploying its own system, negotiating a ban with the Soviets, or increasing the size of its own offensive forces. Indeed, the last of these three options was the original rationale for the development of multiple independently-targetable warheads (MIRVs). The spectre of a costly expansion of the nuclear rivalry into the defensive sphere, combined with the spiralling costs of the USA's involvement in Vietnam, prompted President Johnson to direct his ambassador in Moscow to explore the possibility of negotiations on ABM systems in January, 1967 (12). The USA's motives were therefore economic first, military second, and political third (Figure 4.2).

While Washington's arms control overtures towards the USSR became ever more serious, there remained a high degree of initial reluctance on the part of the Soviets for a number of reasons. The first was the Soviet belief that strategic parity had not yet been achieved. Second, Soviet strategic military doctrine of the day mitigated against the discussing the control of ABMs. Third, the continuing Vietnam War made it politically impossible for Moscow to conduct serious negotiations on such a vital issue with the United States. Thus from the Soviet perspective, the US proposal offered no solutions to the Kremlin's military/crisis stability concerns, which focussed on the US monopoly of submarine-launched ballistic missiles, the primary rationale for the deployment of the Moscow and Leningrad ABM systems in response. It offered no incentive from an economic/arms race perspective, given the Soviet commitment to achieving parity. Finally, it was politically inopportune. Soviet lack of interest in negotiating is demonstrated in Figure 4.3, which reflects the total lack of common ground for the main three stimuli for arms control.

Soviet intransigence prompted the US to announce in September, 1967, its intention to deploy a "narrow" ABM system known as Sentinel (13). The system was envisaged at the time as ostensibly providing for the defence of American Minuteman missile fields against ICBM attack, although McNamara openly acknowledged its limitations in seeking to

justify deployment in response to China nascent nuclear capability (14).

Sentinel's main utility, however, was in forcing the USSR to the arms control negotiating table. In May, 1968, after a series of backdoor negotiations, the Soviets announced their willingness to begin negotiations on the limitation of strategic nuclear delivery systems. While the reversal of the Soviet position was the result of a number of considerations, among them (a) the perception that rough parity with the US in the offensive sphere had finally been achieved, (b) the signing of the Non-proliferation Treaty, offering the Soviets some notion of improved security against the further horizontal proliferation of nuclear weapons, and (c) the political imperative of confirming the USSR's equal status as a superpower, the threat of a new and potentially hugely expensive new arms competition in the strategic defensive sphere was undoubtedly the catalyst (15).

During the signing of the NPT in 1968, President Johnson announced that the Soviets had agreed to talks which would deal with the "reduction and limitation" of both "offensive and defensive" weapons (16). A crude agenda for the negotiations had apparently already been agreed, building upon the US suggestion that the discussions focus on limitations on ABMs, ICBMs, and SLBMs, with no freedom to mix in the latter two systems. No reference to strategic

bombers or limitations on the capability of individual systems was made.

Despite agreement on these broad parameters, serious questions remained to be addressed by both sides from the outset regarding their respective goals and objectives in the negotiations and their perceptions of the other party's priorities. Furthermore, the possibility of agreement was complicated, as Wolfe has suggested, by the asymmetries between the two sides in political outlook, numbers, technical quality, and doctrine of their strategic forces, internal policy-making framework, and relations with allies to name only a few (17).

Of the four agreements signed in May, 1972, the penultimate is generally regarded as the most important, with the final agreement rated over the first and second. The ABM Treaty limited the deployment of such systems to two sites in each nation, one near the capital and the other around an in-place ICBM site. With regard to the two sites, certain specifications were laid down. At each location, a maximum of 100 ABM launchers and interceptors was established, with the radius of the deployment not to exceed 150 kilometers. In addition, the ICBM-ABM site was required to be at least 1,300 kilometers from the capital city. Both signatories agreed not to build a full-scale anti-ballistic missile system for the "defence of its country (18)."

An additional provision was the limitation of each side to no more than 15 ABM launchers at current, or agreed upon,

test bases. The treaty prohibited the development, testing, and deployment of any ABM system or component which was not part of a fixed land-based system as provided for under the agreement. Verification of the treaty was expedited by a prohibition on deliberate measures against the national technical means of the other side. A joint US-Soviet Standing Consultative Commission was established to review compliance with the treaty and seek means for further arms control measures. The ABM Treaty was of unlimited duration; due for review every five years. Each party had the right to withdraw unilaterally if, in its own judgement, "its supreme interests were threatened (19)", provided a six-month warning was given and an identification of the area of threat was made.

While history has been kind to the ABM Treaty, regarding it as a "good" arms control agreement, it is difficult to justify this conclusion based on its comparison in isolation to military/crisis, political/strategic, and economic/arms race criteria identified by the model (Figure 4.4). Only the last consideration is met by the ABM Treaty in any meaningful way, insofar as a costly defensive measures by both sides were avoided. Indeed, taken alone, the ABM Treaty can be regarded as an irrational undertaking which undermined rather than enhanced strategic stability by exposing each side's offensive forces to the growing pre-emptive capacity of the other. The ABM Treaty's political/strategic benefits were similarly limited insofar

Fig.4.3: Soviet lack of interest in arms control in 1967 reflected a lack of common ground in Soviet FP priorities.

Fig.4.4: Impact of the ABM Treaty on arms control.

as the agreement did not address the greatest threat to strategic stability - burgeoning offensive capacity - nor resulted in any tangible quantitative reductions.

The ABM Treaty must, therefore, be considered in tandem with the other three agreements. In particular, the Interim Offensive Arms Agreement was an attempt to freeze further growth in offensive forces by prohibiting both the US and USSR from constructing additional fixed, land-based ICBM launchers after July, 1972. It also fixed the maximum allowable number of ICBMs, allocating the US 1,054, and the USSR 1,618 (20). In addition, restrictions were put on the conversion of "light" ICBM launchers to "heavy" ICBMs, within given constraints. The protocol to the treaty spelled out limitations on SLBM tubes and ballistic missile submarine modernization. Clear limits were set on the increase in size of ICBM silos. At first glance, the utility of the Interim Agreement as an effective arms control accord appears confirmed as it seemingly supported military, political, and economic objectives. Furthermore, the final two understandings in the SALT I package, the Accidental

Measures Agreement and the Revised Hotline Agreement directly addressed military/crisis stability concerns, ostensibly off-setting any negative impact of the Anti-Ballistic Missile Treaty.

Quite clearly, the set of treaties signed in Moscow was of deep significance with regard to the evolving strategic relationship of the two countries and the first important milestone in the strategic nuclear arms control process. The undertaking not to build certain defences - in this case, ABM systems - was without precedent in modern times. A freeze on the further expansion of missile forces was also not without significance. Communications links between the two countries were improved and new consultative procedures established. Moreover, by accepting the overall notion of a "mutual hostage relationship", both sides also mutually accepted for the first time those elements considered essential for a stable deterrence relationship - the unquestioned ability of either nation to annihilate the other while remaining unable to launch a pre-emptive first strike without risking massive retaliation.

SALT I at the same time contained the seeds of discord and disillusionment. For the US, as Barton and Weiler observed, the reality of nuclear parity enshrined in SALT I was a bitter pill to swallow (21), and may have stimulated the United States to seek to regain strategic superiority in other ways rather than accept the new status quo. For the USSR, its strategic offensive force posture had been

developed on the assumption of the availability of a protective ABM network, which may have forced Soviet planners to consider additional offensive measures to compensate. The "limitations" imposed by the Interim Agreement were hardly limitations at all, as both sides had already reached maximum planned ICBM deployments without being pressured by arms control, and the Soviets were allowed to "build up" to the agreed SLBM ceiling. Even more importantly for both sides, however, was the stony silence of the Interim Agreement on the issue of modernization of offensive forces. Technological developments on both sides had already moved beyond the terms of the agreement by the time of its signature and the issue would prove a thorny one for the SALT II negotiations to follow. By retaining modernization as a kind of ace-in-the-hole, both nations allowed the technological imperative to continue to dictate the strategic agenda, forcing policy to play catch-up at the negotiating table rather than allowing it to use arms control agreements to guide the future development of stable, secure, and predictable nuclear forces.

These fundamental flaws in SALT I must nevertheless be considered in the context in which the treaties were signed. Perhaps the most important aspect of SALT I was the commitment of both sides to further negotiations on the limitations of offensive nuclear weapons (22). As but a first step in what was anticipated to be a larger, longer process, the agreement closely approached the central

equilibrium point of the arms control triangle (Figure 4.5). It set the stage for SALT II which held out the hope not only for significant reductions in the numbers and capabilities of the strategic nuclear arsenals of the two sides, but also for reduced significance for nuclear weapons as a whole as instruments for national policy. SALT II, therefore, was to be the standard by which all other contemporary international arms control efforts would be measured.

Fig.4.5: The SALT I accords reflected "good" arms control despite the intended "interim" nature of the package.

The SALT I agreement codified the existence of parity between the USSR and the US in both the strategic offensive and defensive spheres. Setting aside the specific asymmetries in the structure of the strategic offensive forces of each nation, the build-up of these forces throughout the 1960s resulted in an equal capacity for each to effectively cripple the other through a combination of nuclear strikes against military, economic, and political targets in the opposing country.

Complete annihilation of one side by the other as a result of a first-strike nevertheless remained highly unlikely, given the limited capacity, accuracy, and

reliability of existing systems. Despite the US commitment to the concept of mutual assured destruction by this time, ballistic missiles, for example, were limited to single warheads, warhead accuracy was measured in miles, and, with the possible exception of US bomber forces, delivery vehicle readiness and dependability were questionable. The diversification of strategic forces into land-based, sea-based, and air-breathing components offered further stability and security. Great disruption of a nation's infrastructure was guaranteed, but the notion of total obliteration for one side alone is a problematic one under these circumstances.

Deterrence, to the degree that deterrence at the nuclear level was ever viable as a strategy option to political decision-makers, was probably at its most relevant at this particular point in the superpower relationship. This deterrent was not, however, based on anything that was guaranteed or assured at all - the basic premise of traditional deterrence theory and practice - but conversely on the high degree of doubt shared by both countries about the capabilities of its own and the opposing side's nuclear forces to adequately meet strategic requirements in time of war.

Given the technological limitations of the day, the numerical cap on further expansion of these forces introduced by the 1972 Interim Agreement and the severe restrictions placed on strategic defences as a result of the

ABM Treaty, the survivability of American and Soviet strategic nuclear forces was virtually assured. Thus both sides were able to make a virtue of such doubt and uncertainty by linking existing technological limitations in existing delivery systems to the negotiated quantitative limitations in these systems achieved by SALT I. As a snapshot in time, the package of agreements signed in Moscow in 1972 satisfied the criteria for strategic arms control. As Garthoff noted, SALT I was a positive achievement; first, because it marked the beginning of collaborative efforts at strategic arms control and second, it had a clear and mitigating effect on controlling the arms competition between the two nations (23). If this was the case, why was it regarded by many as unsatisfactory?

Unfortunately, SALT I was exactly that - a snapshot in time with a deliberately limited shelf-life. The weaknesses of the agreement bubbled quickly to the surface. SALT I did not address Nye's political or strategic stability criteria nearly as effectively as first thought. While the set of agreements was generally viewed as a positive development by publics on both sides still reeling from the shock of the Cuban Missile Crisis a decade earlier, SALT I should have also aided the overall US-USSR relationship in larger terms by creating an atmosphere of mutual understanding and cooperation on strategic nuclear matters which would in turn exert a positive influence on the other aspects of their relationship. This did not

occur, largely because the two countries failed to share either a common world view or a common view of each other in terms of capabilities and intentions. While SALT I and the detente process were intertwined and did exert a degree of influence over the other, both dealt with the superpower political relationship in the most superficial manner. This superficiality in turn proved to be the downfall of both.

SALT I left both sides to varying degrees politically unsatisfied. For an arms control agreement to be acceptable, it must, in the words of Farley, "not be or appear unequal or disadvantageous (24)." From the American perspective, inequality was not the problem, loss of advantage was. Acceptance of strategic parity with the Soviet Union was especially difficult to swallow. Sullivan suggested, for example, that in SALT I the US had fallen victim to Soviet deceit, and to its own gullibility and myopic assumptions (25).

Almost before the ink was dry on the agreements, a domestic debate was underway in the United States about the desirability of the Interim Agreement. While much of the argument was couched in terms of the military/crisis stability threat posed by the huge Soviet ICBMs allowed by SALT I, the underlying rationale for such criticism was succinctly contained in the Jackson "Sense of Congress" Resolution adopted during the Congressional ratification process. That resolution instructed US negotiators never to accept the concept of inferiority in any future arms control

agreement involving strategic offensive forces (26). In referring to "inferiority," Jackson's real aim was in fact to prevent further erosion in areas where the US still enjoyed a strategic advantage.

Debate in the USSR was less public, but the Soviets, despite seeing SALT I as affirmation of the achievement of equality with the US, nevertheless had some political concerns of their own. Among them was the incompatibility of the mentality behind the ABM Treaty with the traditional attachment of the Russian psyche to a robust defensive posture. Similarly, there was strong discomfort with the absence of limits on the US strategic bomber force, the largest and most accurate leg of the American triad. Finally, the numerical limits imposed by the Interim Agreement impeded upon the Soviet military's penchant for maintaining a large redundancy in capability and equipment. Great suspicion of US intentions remained, as indicated in the critical analyses of influential Soviet officials and commentators such as Bochkarov and Trofimenko (27). Finally, the entire concept of arms control, which postulated mutual management of the superpower rivalry, posed a conundrum for a Soviet foreign policy rooted in the desirability of conflict, the inevitability of war, and the historical determinism of Marxism-Leninism.

The most glaring flaw in the SALT I accords can, however, be seen in their imprecision and obfuscation on the matter of technological development. The failure of the

agreements to adequately restrain the further qualitative development of strategic offences and defences undermined the confidence on both sides that military/crisis stability concerns were being adequately addressed. Krell and Lutz noted that, to be effective, nuclear arms control must reduce the probability of a nuclear conflict by ensuring the stability of the armaments concerned. This stability must occur at three levels:

- (a) stability in time of peace when no party feels obliged to seek further perfection of its arsenal;
- (b) stability in time of crisis when no party has an interest in conducting a first strike; and,
- (c) stability in time of war during which it is possible to gain time and reduce damage to a minimum (28).

These three levels of stability in turn correspond significantly with economic/arms race, military/crisis, and political/strategic stability considerations respectively. Therefore, the inability of arms control agreements to effectively stem or direct further technological developments in armaments will ultimately undermine any political or military stability which may have been achieved by the agreement and, as suggested by Krell and Lutz, not only potentially increase the possibility of conflict, but also the intensity of that conflict should it ultimately occur.

SALT I did little to halt the qualitative evolution of strategic forces in this regard. The most immediate reflection of this inadequacy was found in the terms of the

Interim Agreement on offensive forces. Although indeed intended merely as a "negotiating freeze arrangement to hold the situation to permit is to, hopefully, negotiate a treaty to match in the offensive field the treaty that we have succeeded in negotiating in the defensive field (29)", the agreement nevertheless ignored such critical strategic balance and stability issues as the research and development of MIRVs, the modernization or replacement of existing ICBMs (particularly the Soviet heavy ICBM force), and new developments in the air-breathing leg of the triad (such as the US investigation of the potential of stand-off missiles). All of these aspects were under active consideration by both sides at the time they were negotiating SALT I. Nitze was highly critical of SALT I as a result noting that:

"paradoxically, it stimulated the drive to upgrade weapons by placing an innocuous limit to a 'stockpile race' of earlier generation missiles while, at the same time, offering irresistible incentives to the winners of the 'R & D race' for superiority in the art of blinding or destroying enemy systems before they can do their job (30)."

The deliberate effort to avoid restrictions on future technological development was in fact openly acknowledged by Secretary of Defence Laird when he indicated that the US Administration's acquiescence to the agreements was contingent upon Congressional support for future strategic programmes (31). While some observers saw this as a dedicated negotiating strategy aimed at developing "bargaining chips" to be exchanged for concessions from the

other side (32), it can be equally argued that such remarks simply demonstrated at best and inherent acceptance by national leaders and public officials of the inevitability of technological advance, and at worst, clear symptoms of Rapoport's "technolatry" syndrome (33). Even the Anti-Ballistic Missile Treaty, which severely restricted ABM deployments, contained dangerous technological loopholes embodied in the relationship between Article V and Agreed Statement D of the treaty which were to surface more than a decade later in the Reagan Administration's attempt to re-interpret the treaty in the context of its investigation of the feasibility of strategic defences (34).

It is also apparent that the final terms of the Interim Agreement did not just fail to address the technological issue, but actually encouraged the parties to undertake further action to improve the capability and effectiveness of their strategic offensive forces. The numerical ceilings on total missile launchers in themselves allowed for a further build-up of forces rather than the build-down one normally associates with an arms control agreement, as evidenced by the hastily-cobbled-together last-minute arrangements in Moscow which allowed the USSR further increases in its SLBM launcher totals (35). This may have simply been a case of poor negotiating, but it is more likely an example of expedient politicians seeking short term political gain at the expense of longer-term military security. The ultimate result was a further undermining of

the third and final leg of the arms control triad - economic/arms race stability.

SALT II 1972-79: THE MAIN EVENT OR JUST ROUND TWO?

While a useful short-term exercise which advanced the arms control timetable, these inadequacies in SALT I set the agenda for the SALT II negotiations which began in November 1972. This agenda should have emphasized qualitative limitations on strategic offensive forces as the first priority. Rather than looking forward and advancing the strategic nuclear arms control process by expanding and strengthening the mandate of the negotiations into these other areas of their strategic rivalry, however, SALT II was immediately seen by the coalition of military leaders and political officials on both sides unhappy with the terms of SALT I, or philosophically opposed to cooperative arms control of any kind, as a vehicle for reopening SALT I and looking into the past to address and set right the perceived flaws in the previous set of agreements just concluded. Moreover, the uncertainty engendered by the failure of SALT I to satisfactorily deal with the issues of political, military, and economic stability in turn grew as dissatisfaction with the state of affairs in each of these three areas fed upon and exacerbated fears which eroded the confidence of the two sides in the ability of their strategic arsenals to manage crisis or military stability. SALT II, therefore, instead of being seen for what it was -

round two of a longer term process - laboured under this cloud from the outset, held together only by the ambient momentum generated by detente and the warming of relations between East and West in the early 1970s. It was inevitable as a result that the negotiations should encounter serious difficulties when this atmosphere of cooperation and accommodation elsewhere in the superpower relationship dissipated later.

The very complexity of the issues at play in SALT II were also a serious impediment to the successful conclusion of negotiations. Seen against the need to thrash out the positions of the two sides on such highly complicated and linked qualitative aspects as MIRVs, missile throwweight, and bomber capabilities, to name but a few, the task assigned by SALT I of constraining and verifying easily identifiable ABM and ballistic missile systems was relatively simple. SALT II, because it sought to deal specifically with those aspects which affected the capability and disposition of each side's nuclear forces rather than just aggregate numbers, was primarily intended to directly address the matter of military/crisis stability. In addition, the linkage between the necessity for controls on economic/arms race aspects of the superpower nuclear rivalry and the enhancement of stability were openly recognized by both sides from the outset (36).

Kissinger, in commenting on the objectives of SALT II, underlined, for example, qualitative restraint and

limitations on modernization in addition to mere numerical reductions (37). The complexity of the issues under negotiation, however, prolonged the talks well beyond their 1974 deadline, and with each subsequent delay, the desirability of reaching an accommodation or compromise which would meet immediate political/strategic stability concerns became more and more attractive to the leaders of both sides, particularly as detente disintegrated. This political imperative was to undermine, however, what should have been the primary military/crisis stability goals of the negotiations.

In assessing the outcome of the SALT II negotiations as an example of effective nuclear arms control, a comparison must be made with the initial goals and objectives of the two superpowers, both those publicly stated in the Agreement on Basic Principles issued in June 21, 1973, and those which were to be reflected in their individual negotiating positions, to determine (a) whether these goals and objectives satisfied ipso facto the criteria for effective arms control this paper has attempted to establish drawing upon the contributions of Schelling, Nye, Krell, Lutz, and other observers, and, if so, (b) whether the eventual agreement achieved in 1979 met these requirements. The outcome of SALT II will then be tested by a comparison of the composition and nature of the strategic nuclear forces of both superpowers at the time of the 1979 agreement

against the structure of these forces seven years earlier at the signing of SALT I.

The agreed goals of the SALT II negotiations were:

- (1) a permanent agreement on the limitation of strategic arms, as well as their subsequent reduction;
- (2) recognition of each other's security interests and commitment not to seek unilateral advantage;
- (3) limitations to apply to both quantitative and qualitative aspects;
- (4) limitations to be subject to adequate verification by national technical means;
- (5) modernization to be permitted;
- (6) commitment to negotiate additional measures to supplement the 1972 Interim Agreement pending the achievement of a permanent agreement; and,
- (7) commitment to undertake unilateral organizational and technical measures to prevent the accidental or unauthorized use of nuclear weapons (38).

These criteria, for those viewing arms control as primarily a numbers game with reductions in the number of nuclear weapons and delivery systems as its main justification, must have been disappointing. They were equally modest for those who regarded arms control as a careful balance of military/crisis, political/strategic, and economic/arms race considerations. The principles referred only to vaguely defined limitations "to apply to both quantitative and qualitative aspects." Controls on modernization were expressly rejected and actual numerical reductions ambiguously defined as "subsequent." Thus any benefits which might accrue in the enhancement of military or economic stability from the pursuit of these objectives were questionable indeed. Furthermore, the principles

seemed designed not to achieve particular political gains by enhancing detente, but rather merely to confirm and entrench the superpower bi-polar rivalry by simply confirming each other's security interests and promising not to interfere with the pursuit of these interests, which were generally accepted to be contradictory. For the United States, this meant a continuation of the 30-year old policy of active containment of the USSR. For the Soviets, it meant tacit US acquiescence to the Marxist-Leninist priority of international revolution and the spread of communism.

Disappointing as these "agreed" principles were, they nevertheless reflected the divergence of views of the two sides on the intended utility of SALT II. In addition to these agreed objectives, it must be noted that each side also retained individual goals which were in some cases compatible with the Basic Principles' guidelines, and in some cases not. These individual national goals largely reflected what each side saw as the flaws in the results of SALT I.

For the United States, this meant pursuit of:

- (a) limitations consistent with the actuality and appearance of rough parity in the offensive strategic nuclear capabilities of the two sides;
- (b) limitations such as would assure the maintenance of stability in a crisis threatening the outbreak of war, i. e. force deployments such that neither side could expect to gain, relative to the other superpower by striking first;
- (c) a reduction in resources, having achieved the above objectives, devoted to nuclear armaments; and,

- (d) achievement of an agreement politically acceptable to both sides (39).

These criteria, especially (b), (c), and (d), struck a much better balance among the military, economic, and political stability criteria this paper has sought to associate with effective arms control. They reflected US disappointment at the inability of both sides in SALT I to negotiate a permanent agreement of unlimited duration effectively limiting strategic offensive forces, concern at the loss of essential equivalence through Soviet retention of its heavy ICBM force, anticipation of the loss of military stability with a growing Soviet capacity to launch an effective first strike against American ICBM silos, economic worry that the US could easily be outspent by the USSR in the military sphere, and Executive Branch political paranoia about the ability of Congress to obstruct or scuttle an agreement it saw as being inferior. To accomplish these objectives, US negotiating tactics would obviously be designed to seek to protect areas of US advantage, notably in qualitative areas, while attempting to secure Soviet concessions primarily of a quantitative nature which would address American military, economic, and as a consequence, political concerns (Figure 4.6).

Soviet priorities for SALT II included:

- (a) reaffirmation of the USSR as a global superpower equal in status and power to the United States;
- (b) the maintenance of strategic forces at a level deemed sufficient to protect the security and territorial integrity of the Motherland;

- (c) the prevention of the possibility of accidental nuclear war or the launching of a disarming first strike; and,
- (d) limitations which would relieve the economic strain engendered by an unbridled competition between the two countries in the strategic sphere (40).

These priorities, too, bore in mind all three aspects of effective arms control, but supported in particular the Soviet Union's preoccupation with the desirability of political stability in terms of the overall superpower relationship and the Soviet Government's image both at home and abroad. Furthermore, fear of American technological advantage, and recognition of the economic inequality between the two nations weighed heavily upon the USSR's traditional obsession with the maintenance of large military forces to meet national defence requirements, which in turn had directed the development of Soviet nuclear doctrine and its strategic forces. Thus Soviet motives focussed primarily on political/strategic and economic/arms race objectives, presuming that if these were achieved, military or crisis stability would follow (Figure 4.7). The Soviets, too, sought at the same time to protect areas of quantitative advantage while seeking to limit or erode the USA's qualitative edge.

Fig.4.6: US SALT II goals.

Fig.4.7: USSR SALT II goals.

Progress in the new negotiations was virtually stalled for almost two years. This was understandable given the dissonance in the priorities established by the two sides for the talks. While the domestic turmoil of Watergate in the United States undoubtedly had an impact in diverting the Nixon Administration's full attention from the strategic arms control process, the impasse also reflected the difficulty of the military issues which SALT I had conveniently set aside. Some minor additional accords, such as the June, 1973 Agreement on the Prevention of Nuclear War, and the July, 1974 Protocol to the Treaty on Anti-Ballistic Missile Systems were realized (41), but these were largely peripheral to the main substantive issues relevant to SALT II. Wolfe identified these issues as:

- (a) how to convert the Interim Agreement into a permanent agreement which would satisfy what the Soviets referred to as "equal security and no unilateral advantage" and what the US saw as "essential equivalence",
- (b) what to do about MIRVed systems; and,
- (c) the relationship of US forward-based systems to the strategic arms control process (42).

The opening US negotiating position in Geneva focussed on achieving overall quantitative equality in aggregate numbers of central strategic delivery systems (ballistic missiles and bombers), a reflection of the mandate imposed by Congress in accepting the numerical inequality of SALT I (43). Each nation would be allowed to deploy any combination of ICBMs, SLBMs, and bombers provided the combined total did not exceed the aggregate SNDV ceiling.

Thus, the numerical disparities favouring the Soviets in SALT I would be eliminated. As a qualitative arms control measure, an approximate equality in the capability of these systems would also be negotiated, focussing on throwweight (payload in the case of bombers) as the primary unit of account. The aggregate throwweight of each country's MIRVed missiles in particular would be set at equal levels in order to limit MIRV deployments. The parochialism of the US position was obvious - protection of US bomber and SLBM superiority while seeking to cut heavily into Soviet heavy ICBM capability. US concerns about Soviet "heavies" had been justified in the summer of 1973 when the USSR began testing a new generation of ICBMs, some with a MIRV capability (44).

Initially, the USSR rejected the US notion of parity, seeking to retain the numerical advantages in SNDVs and total throwweight gained in SALT I. Furthermore, they stated that the numerical advantage they enjoyed in central strategic systems was compensation for the existence of US forward-based nuclear forces surrounding the periphery of the Soviet Union (45). Soviet negotiators also refused to consider the use of throwweight to limit MIRVs, countering with a proposal to establish a ceiling in the number of MIRVed missiles. Finally, the USSR sought a ban on the planned US B-1 bomber and Trident ballistic missile submarine, while allowing further production of its own Backfire bomber.

It is difficult in examining these opening negotiating positions to see much real commitment to the seven 1972 Basic Principle (to the degree that these principles themselves reflected effective arms control). In focussing uniquely on SNDVs, the issue of limiting or reducing nuclear arms (i.e. warheads) per se was side-stepped. Both proposals sought to achieve unilateral advantage by limiting only the strengths of the other. The quantitative and qualitative limits proposed would have had no impact on the strategic forces of the two countries as then structured. No verification measures were specifically proposed, nor were any new additional crisis stability initiatives to supplement the 1973 Prevention of Nuclear War and 1974 ABM Treaty Protocols tabled. New unilateral organizational and technical measures to prevent accidental or unauthorized use of nuclear weapons were neither negotiable nor verifiable.

In fact, the only Basic Principle truly reflected in the opening positions of the two sides in Geneva was the commitment to continued modernization, itself a highly questionable contribution to arms control. Of additional national goals and objectives, the US proposal met only the last of the four identified. It sought to meet the political goal of appeasing a restive Congress (Figure 4.8). On the Soviet side, its first SALT II proposal was only slightly more balanced, emphasizing the political objective of enshrining its status as a superpower, and the military

objective of removing the immediate threat of US forward-based systems (Figure 4.9).

The Vladivostok Summit between Brezhnev and President Ford in November, 1974, was widely considered a breakthrough in the SALT II process. While initially intended as a "get-to-know each other" session aimed at "breathing new life

Fig.4.8: Opening US
SALT II proposal - 1972

Fig.4.9: Opening Soviet
SALT II proposal - 1972

into the Soviet-American relationship at a time of perilous uncertainty (46)", a flurry of backchannel consultations so favoured by Kissinger resulted in the Vladivostok Declaration on strategic offensive weapons of November 23, 1974 (47). The declaration committed the parties to the achievement of a strategic arms limitation agreement which would incorporate the elements of the 1972 Interim Agreement and cover the period from October, 1977 (the expiry date of SALT I) until December, 1985. More importantly, it established for the first time agreed numerical goals for SALT II of 2,400 SNDVs, of which 1,320 could be MIRVed launchers (48).

Far from signalling a new stage in the strategic arms control process, the Vladivostok Declaration in many ways opened the door to both parties to further increase their

nuclear firepower in both quantitative and qualitative terms, thus undermining all three aspects of an effective arms control process. As has been seen on repeated occasions throughout the superpower negotiating process, the growing pressure for an agreement (emanating largely from an uninformed public interested only in quantitative issues) to meet short-term political goals on both sides resulted in last-minute, hastily-conceived concessions often detrimental to the final outcome.

As in the case of the SALT I Interim Agreement, what was not in the 1974 declaration is even more important than what was. At Vladivostok, the USSR did drop its insistence that it be compensated for US forward-based systems and British and French nuclear forces, but in return the US was forced to give up its effort to negotiate limitations in missile throwweight and, as a consequence, its effort to reduce the number of Soviet heavy ICBMs. There was much criticism that the SNDV ceilings were excessively high (49). US SNDV and MIRVed missile levels were already well below the limits of 2,400 and 1,320 respectively, while the USSR was only slightly above the aggregate SNDV level and had not yet deployed a MIRVed launcher (50).

In addition, other strategic systems such as cruise missiles, mobile ICBMs, and related technological factors as missile flight testing, cold launch techniques and improved warhead accuracy, to name but a few, were ignored entirely. Thus it was clear that already by 1974 the fundamental

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principle underpinning the US objectives in the talks, reductions in those Soviet strategic systems seen as the most threatening to the US arsenal, and to military/crisis stability, had been abandoned. Political/strategic considerations began to emerge as the primary motivation for remaining at the bargaining table. While this may have brought the goals of the two sides into greater harmony, thus increasing the chances for a successful conclusion, the asymmetrical relationship between the political, military, and economic aspects of the evolving objectives of the talks made for dubious arms control from a stability and security perspective (Figure 4.10).

Fig.4.10: The 1974 Vladivostok Declaration and the growing disequilibrium

When the SALT II negotiations resumed in Geneva in January, 1975, three areas were the main focus of attention - cruise missiles, the Soviet Backfire bomber, and the verification of the MIRVed missile ceiling. The cruise missile issue surfaced in discussions of what weapons were to be included in the 2,400 SNDV ceiling. Acutely concerned with the new interest being demonstrated by the US in unmanned, subsonic, jet-powered drones, the USSR sought to have cruise missiles banned; the US sought to have them

exempted from the negotiations. Conversely, the US insisted that the new supersonic Backfire bomber be included in the SALT II limits, while the Soviets called the aircraft a medium-range bomber. The most practical arms control solution should have been to limit both. The US also argued that all types of ballistic missiles tested in a MIRVed mode be included under the 1,320 sub-ceiling, a useful arms control initiative and a return to an emphasis on military/crisis stability concerns. The Soviets rejected this, stating that some missiles tested for MIRV capability would remain single warhead systems.

By late 1975, there were subtle indications that a compromise was evolving involving cruise missiles and the Backfire. In September, the US proposed allowing a certain number of Backfire bombers over and above the 2,400 SNDV limit in return for excluding a similar number of US cruise missile carriers from the negotiations (51). The Soviets countered by dropping their ban on cruise missiles, but insisting that the missiles be included in the aggregate ceiling. In January, 1976, Kissinger then proposed to Gromyko that heavy bombers armed with cruise missiles could be included in the 1,320 MIRVed SNDV sub-ceiling if the Soviets considered some as-yet undefined constraints on the Backfire (52). This proposal was accepted, although the definition of a "heavy" bomber remained as moot as had the definition of "heavy" missile in SALT I. The Soviets, for their part, in effectively allowing for the relatively

unrestricted deployment of US cruise missiles had conceded a key element of their negotiating strategy - to restrain US technological advantage. The US, in allowing for the deployment of the Backfire outside of the limitations established by the Vladivostok SNDV limits, signalled its willingness to ignore effective quantitative constraints. On top of the already generous ceilings agreed to at Vladivostok, the SALT II negotiations were rapidly losing their relevance.

On the matter of MIRVed systems, the US floated a number of proposals all aimed at regaining the ground lost in Vladivostok in trying to limit the MIRVing of Soviet heavy missiles. The issue had assumed even greater importance with the news of the deployment of the first Soviet MIRVed missile in early 1975 (53). Finally, in May, 1975, the US proposed restricting MIRVed ICBMs to specific missile fields (54). The Soviets, to the surprise of the US delegation, countered by accepting the original US proposal to include all missiles of a type successfully tested with MIRVs as counting against the 1,320 sub-limit. The two sides also agreed on verification rules banning the storage of spare missiles or rapid reloading equipment near existing launch sites, and the Soviets agreed to unilateral, but unverifiable limits on the payloads of their largest heavy missiles. Labrie speculated that the two sides were by the middle of 1976 very close to a final agreement, with 90% of the treaty language reportedly completed (55), when US

domestic politics once again interfered with the process. As indicated earlier, the terms of the agreement would not only have codified existing levels of arms, but allowed for virtually unrestricted further refinement, diversification and expansion of these arsenals in new technological areas.

President Carter entered the White House in 1977 committed to a new approach to government, which had ramifications both at the domestic and international levels. In particular, Carter promised to "move this year toward our ultimate goal - the elimination of all nuclear weapons from this earth (56)." Despite this, it was apparent that he had inherited from his predecessors, as Talbott pointed out, "an ill-defined commitment and a well-defined stalemate (57)" at the strategic level. Carter perceived, quite correctly, that previous nuclear arms control efforts had largely been pursued by his predecessors (and undoubtedly by their Soviet counterparts) for their political significance. Given the criticism of SALT I and the growing opposition to the direction being taken by SALT II, even here the results had been less than satisfactory. He, on the other hand, regarded the SALT II process as a vehicle for addressing directly the military/crisis and economic/arms race factors that engendered instability in the superpower relationship. As an aside, this is a revealing commentary on the astuteness of a President whom history has erroneously written off as a misguided human rights ideologue. Few recall Carter's background as both an expert in nuclear

propulsion and a career officer in the US submarine service. The Carter Administration assumed office determined to pursue a comprehensive security policy which would not only make these areas the focus of arms control, but which would also adopt an innovative approach to strategic defence planning that rejected the necessity of maintaining essential equivalence with Soviet capabilities.

Elements of this new approach formed the basis for one of two strategic arms proposals made to the Soviets by Secretary of State Vance in March, 1977. The first sought reductions significantly below the Vladivostok levels in the overall SNDV aggregate, MIRVed launcher sub-ceiling, heavy ICBMs, and ICBMs equipped with MIRVs (Table 4.1) (58). While clearly intended to meet growing US military/crisis stability concerns about the increasing threat of a large MIRVed Soviet ICBM force to its own Minutemen missiles, the

Table 4.1

<u>INTERIM AGREEMENT</u>	<u>VLADIVOSTOK ACCORD</u>	<u>CARTER PROPOSAL</u>
US - 1054 ICBMs	2400 SNDVs each	1800-2000 SNDVs
710 SLBMs	1320 MIRVed SNDVs	1100-1200 MIRVed
USSR - 1618 ICBMs	No new ICBM	SNDVs
950 SLBMs	launchers	550 MIRVed ICBMs
No new ICBM	Limit on new types	150-300 heavy
launchers	of offensive arms	ICBMs
No conversion of	11-yr duration	No new ICBMs
light ICBM		Limit ALCM range
launchers		
5-yr duration		

Carter comprehensive option also contained several significant aspects directly addressing the issue of qualitative improvements, such as limitations on flight

testing, a ban on ballistic missile modernization or replacement, a prohibition on mobile ICBMs, and range limitations on cruise missiles. This proposal was an admirable effort to achieve the equilibrium point of the arms control triangle (Figure 4.11).

Fig.4.11: The merits of the 1977 Carter Comprehensive Proposal

The second proposal in this oddly schizophrenic approach, however, offered an agreement based on the Vladivostok understanding, but deferring the matter of cruise missiles and the Backfire bomber to future talks. This proposal from an effective arms control perspective had little merit. The Soviets, not from any commitment to equitable and effective arms control, but more from sheer confusion, angrily rejected both proposals as backtracking on what had already been agreed to in Geneva.

Chastised by the negative Soviet response, the Carter Administration regrouped and presented a revised proposal at the negotiations in Geneva in May. This new initiative was a complicated three-tier approach which involved an agreement based on the Vladivostok understanding, slightly modified, running until 1985, a separate three-year protocol covering disputed weapons systems such as cruise missiles

and mobile ICBMs, and a declaration of principles and guidelines for a SALT III negotiation (59). While agreement was reached in April, 1978, to lower the aggregate SNDV level to 2,250, the MIRVed launcher limit to 1,200, and the MIRVed ICBM ceiling to 820, the date for such reductions was left undetermined, and progress on "nitty-gritty" matters such as data exchange and verification procedures remained "glacial (60)". The deferral of discussions on critical weapons systems, such as cruise and mobile missiles, whose qualitative aspects had a direct impact on military/crisis stability, was disappointing. The vagueness of the reductions timetable and the lack of controls on modernization had little to offer in the area of economic/arms race stability. As a result, it is readily apparent that the proposal would engender little support from a political/strategic perspective, despite the political imperative driving the leaders and negotiators on both sides to finalize the process.

With each high-level visit throughout 1978, each side continued to offer up concessions to the other which further compromised their original objectives in entering into the negotiations. The United States gave up its proposed ban on mobile missiles. The USSR relaxed its opposition to US ALCMs. Both sides accepted the desirability of missile modernization, and agreed to unilateral, non-verifiable declarations about the "fractionation" (MIRV) capacity of their strategic missiles, in some cases at levels clearly

higher than current operational deployments, while in others clearly lower than current throwweight capability (61). In making such compromises, the two nations inevitably rendered the SALT II process more and more politically unpalatable and militarily irrelevant. The emerging framework of an agreement furthermore left both sides to continue their strategic rivalry with the consequent negative economic implications. As superpower relations deteriorated generally, SALT II came to be viewed more as a burden than a benefit. US officials began to refer to the "linkage" between the negotiations and Soviet behaviour elsewhere, while the Soviets accused the US of "unsavoury and dangerous" statements and "indecision and inconsistency" in SALT (62).

With the resolution of the final outstanding verification issues in May, the seven-year process concluded with the signing of the SALT II Treaty by Carter and Brezhnev in Vienna on June 18, 1979. The major aspects of the treaty are summarized in Table 4.2 below and compared with current force deployments.

The history of the ill-fated ratification process for SALT II is well-known. The treaty succumbed to the deteriorating state of US-Soviet relations internationally, and the growing polarization of domestic politics in the United States concerning the perceived utility of the strategic arms control process in meeting American security requirements. While academic proponents of the SALT process

TABLE 4.2

<u>Treaty Limit</u>	<u>Current forces (1979)</u>
1. Equal aggregate SNDV limit of 2400 falling to 2250 in 1981	- US - 2284 SNDVs USSR - 2504 SNDVs
2. 1320 MIRVed BM launchers and ALCM bombers	- US - 1046 MIRVed launchers (no ALCM bombers) USSR - 704 MIRVed launchers (no ALCM bombers)
3. 1200 MIRVed BM launchers	- see above
4. 820 MIRVed ICBM launcher	- US - 550 MIRVed ICBMs USSR - 576 MIRVed ICBMs
5. No additional fixed ICBM launchers	- none under construction
6. No additional heavy ICBM launchers	- no indication of any planned
7. No heavy mobile ICBM, heavy SLBM, or heavy ASBM launchers	- none under development
8. Flight-testing and deployment of one new light ICBM permitted	- US testing one; USSR testing two
9. No increase in the number of warheads on existing ICBMs	
10. Limit of 10 warheads on new ICBMs	- maximum number planned for US MX and Sov SS-X-24.
11. Limit of 14 warheads on SLBMs	- maximum number on US Poseidon
12. Limit of 28 ALCMs per bomber; 20 on existing bombers	- 20 ALCMs max capacity for B-52; 4 for TU-95
13. Ceilings on launch weight and throw-weight of BMs	- Ceiling designated as current weights of SS-18
14. No rapid reload for ICBMs	- such systems undefined
15. Ban on "certain types" of new strategic systems, such as BMs on surface ships or seabed	- none known to be planned
16. Advance notification of ICBM test launches	
17. Agreed data base	

(Data drawn from Arms Control and Disarmament Agreements: Texts and Histories of Negotiations, The Military Balance 1979-80, and World Weapon Database, Vol. 1: Soviet Missiles)

such as Semeiko, Treverton, Pierre, and Freedman valiantly fought for acceptance of the treaty from a political/strategic stability perspective as an improvement on previous efforts and necessary to bolster failing bilateral relations, domestic, and international support (63), their lack of influence resulted in the views of this small group of supporters being lost in the clamour against the agreement emanating from both the left and the right of the political spectrum.

Among neo-conservatives clustering around the influential Committee for the Present Danger (64), Rostow bluntly labelled the agreement "an act of appeasement (65)." Gray thought the US Government "had no business negotiating SALT treaties" when it was obvious that "the US does not know what it wants or why (66)." Partisan political rhetoric aside, the concerns expressed by these authors reflected the inadequacy of the terms of the agreement from a military/crisis stability perspective. Other critics from the left such as Thee and Huntzinger were, at the same time, equally vocal about the clear loopholes in the SALT II agreement on further technological development of strategic nuclear forces and the implications for economic/arms race stability (67). These observers suggested that SALT II had above all emphasized, as Gerson made clear, the fundamental incompatibility of arms control and arms acquisition as means toward national security (68).

The SALT II Treaty therefore failed for four reasons. One was the incompatibility of the objectives of the two sides for the negotiations from the outset. Second, neither opening position was balanced; the US favouring military/crisis stability goals, and the Soviets political/strategic stability priorities. Three, eventual agreement was reached on the basis of concessions which did not enhance the balance between military/crisis, political/strategic, and economic/arms race concerns, but undermined mutual military/crisis stability requirements and failed to address economic/arms race issues at all. Finally, the mounting clamour for an agreement at the end weighted the outcome in favour of political/strategic considerations. So while the two sides ultimately agreed to the terms of the treaty as a result of the convergence of their priorities around political/strategic considerations (Figure 4.12), its results left one of the two parties, the United States, unsatisfied.

Fig.4.12: The outcome of the SALT II negotiating process: a political solution and "poor" arms control.

CHAPTER FIVE

US-SOVIET STRATEGIC NUCLEAR FORCE DEVELOPMENTS - 1972-79: ARMS CONTROL VERSUS THE TECHNOLOGICAL IMPERATIVE

Given the rapid dissipation of support for the results of the SALT II negotiations and the growing unease of both countries by the end of the 1970s concerning each side's perceived susceptibility to a first-strike attack by the other despite the agreement, one is left to wonder what the negotiators missed which might have provoked such an abnormal reaction to what should have been a welcome development.

On the basis of the descriptive model developed using the criteria for effective arms control as defined by the various specialists in the field discussed in chapter three, this paper has attempted to establish that the initial goals of the US and USSR in the SALT II negotiations were not only incompatible in their individual emphases, but also each in their own way imbalanced in terms of their overall approach to military, political, and economic imperatives which initially gave rise to the pursuit of the strategic arms control process. Furthermore, while the objectives of the two sides eventually converged over seven years of negotiations to form the basis of what became the SALT II Treaty, it is evident that these now mutual objectives still remained in the end unbalanced, and resulted in what can only be termed a "bad" agreement insofar as the three arms

control imperatives identified by the model were not satisfied on an equal basis.

Arguably, the flaw lay in the inability of SALT II to address the qualitative improvement in the overall offensive capability of the arsenals of each side despite apparent caps achieved on their numerical size. In the view of the author, the key lies in a re-examination of the economic/arms race leg of the arms control stability triangle, and in particular the issue of technological development. Technology, as Freud pointed out, is nothing more than a set of artificial implements which are intended to extend the range of our natural existing senses and physical capabilities. At the same time, he also pointed out that these new organs have "not grown onto (Man) and they still give him much trouble at times (1)."

This propensity for the invention of better, bigger, faster, more efficient tools is a double-edged sword. As our power has increased with each new generation of prostheses, so has the necessity for circumspection and caution in our use of this power. This is the conundrum of technological development. While technology has emancipated large portions of humanity from the drudgery of a subsistence existence, it has equally created the capacity, in the context of nuclear weapons, to return us within a matter of only minutes to this subsistence level, if not eliminate us as a species altogether. Nuclear weapons to paraphrase Freud, have given us the greatest trouble of all.

To understand the implications of uncontrolled technological development in the context of arms control, one must first determine the source of the stimulus to produce better and bigger weapons. Existing explanations for the qualitative aspect of the nuclear arms control stability model have, as in the case of Nye's model, emphasized economic or arms race stability. These approaches have placed heavy emphasis on the two-player, action-reaction scenarios favoured by classical quantitative arms race theorists such as Richardson, Boulding, and Wallace (2). In the post-war period, the exponential qualitative improvements offered by nuclear arms over conventional weaponry led new wave arms race theorists such as Craig, Rapoport, and Wagner to build upon the work of their predecessors and develop various versions of qualitative arms race theory (3). Weber's attempt to integrate existing game theoretic analyses of superpower arms control to include state strategy is the most recent variation of this two-player theme (4).

It was Wagner, however, who was among the first to propose dropping the notion of a competitive inter-state framework, suggesting that a nation's own armament levels and technical expertise can alone stimulate further increases (5). Evangelista has built upon this work to further develop the theory of 'innovation' in which "a new weapon starts with a technological idea rather than as a response to a specific threat or as a means to fulfil a

long-standing mission (6)." This perspective is similar to the neo-Marxist school's emphasis on the "permanent war economy (7)," or Eisenhower's "military-industrial complex (8)." These unitary or independent stimulus theories converge with other interesting, albeit untestable, psychological-sociological musings on the notion of autonomous technological development, in which such development is independent and inevitable and human beings are seen as powerless against its deleterious effects and reduced to merely accommodating ourselves to its inevitability (9).

Whatever the source of one's thinking about the origins of technological development, the apparent lack of an interrelationship between the "control" of arms and the development of new weapons as symbolized by the example of SALT II suggests a need to revisit this aspect in the context of the triangular arms control stability model. The criteria established by other authors for the existing economic/arms race leg of the model appears, on the basis of this chapter's very brief discussion, to ignore a number of variables independent from the competitive inter-state relationship which could explain weapons development and modernization. Evangelista underlined how greater attention by theorists and decision-makers alike to the various stages in the development of new weapons systems could assist in identifying how and when influence through such mechanisms as arms control might be exerted to affect the outcome (10).

Bringing these new considerations to bear on the economic/arms race criteria developed by Nye, a separation of these two aspects into individual legs of a new three-dimensional arms control model emphasizing external-economic-arms race and internal-technological-innovation factors could offer increased explanatory power and therefore increased effectiveness for arms control policy-makers and theorists as a tool for pursuing useful and relevant arms control initiatives (Figure 6.1).

Fig.6.1: A suggested improvement for the arms control stability model.

Finding the new equilibrium point in this now three-dimensional process becomes an undertaking of considerably more complexity, but potentially more rewarding both as an analytical and a policy prescriptive tool. Including a uniquely technological leg of the model would allow for greater reflection on the variety of forces which drive weapons development and which have remained largely unaddressed in most arms control discussions to date.

The ultimate test of these observations lies in a determination of the contribution of SALT II to strategic stability and national security through its ability to effectively control technological developments detrimental

to the achievement of these objectives. The most relevant barometer in this regard is the nature and composition of the strategic offensive forces of the two sides during the period covered by the negotiations. A simple comparison therefore of the strategic arsenals at the beginning of the negotiations in 1972 with these same forces in 1979 will offer an accurate indication of the effect of the evolution of these forces on strategic stability and security and the degree to which the SALT II agreement exerted an influence, either positive or negative, on this environment. The conclusions drawn will subsequently confirm or reject the hypotheses presented regarding the relative utility of SALT II as an effective arms control agreement.

Accurate or relevant comparisons of the strategic nuclear forces of the United States and the Soviet Union are fraught with difficulties. Clearly, depending upon what information the analyst is searching for, or the conclusion one is seeking to discover or confirm, any number of criteria are available. The very proliferation of such criteria, both quantitative and qualitative, in discussing the strategic nuclear balance makes the use of any single unit of measurement of limited utility. At best, anything less than an exhaustive comparison and analysis of a myriad of qualitative and quantitative factors, which is understandably beyond the bounds of the paper, will provide but a crude comparison.

The capability of each superpower's strategic nuclear forces can be measured by any number of individual quantitative categories, ranging from numbers of strategic nuclear delivery vehicles and warheads to total destructive power. Each suffers from particular weaknesses. A focus on SNDVs alone gives no inkling of the rapid increase in the number of warheads which came into service on each side during the decade of the 1970s. Conversely, warheads themselves are not particularly useful if the means to effectively deliver them to the target are missing. Similarly, total destructive power will not provide an accurate understanding, as equivalent megatonnage totals on both sides have, for example, declined since the late 1960s (11).

Such analyses can nevertheless be enhanced by considering qualitative factors which give an indication of the effectiveness and potential of the weapons systems concerned. The range, throwweight and accuracy of SNDVs, the capability of warheads (penetrivity), and the reliability and location of these strategic systems are all as important as are their sheer numbers.

The ostensible goal of maintaining strategic nuclear forces, according to the established strategic doctrine on both sides, was for the last two decades of the Cold War to deter the other side from attacking by maintaining forces which are both survivable to a first strike and capable of retaliating with enough remaining forces to destroy the

attacker's military, political, and economic infrastructure. These two factors of survivability and retaliatory capability ensure the introduction of a degree of dynamism at the same time which fosters a desire to continually seek quantitative and/or qualitative improvements in these offensive forces which exceeds the mere matching of the number of potential targets to the number of available weapons. In terms of strike capability, a variety of considerations enter into the strategic force planning equation. Not all weapons will be serviceable at any given point in time. Many targets will receive multiple coverage to assure destruction. A certain percentage of the force will be held back in reserve for subsequent attacks or post-attack bargaining. In ensuring the survivability of these forces, different basing modes, improved system reaction times, and the insurance of capable command, control, and communications facilities in times of crisis or war are examples of relevant considerations.

It was readily apparent in 1972 that the existing strategic arsenals of the US and USSR were sufficient to meet these national security needs. As the distinguished strategic analysis organization, the International Institute for Strategic Studies, noted at that time;

"while the United States and the Soviet Union are entirely unable to disarm each other by a first strike against strategic forces, each has within its armoury a number and variety of both delivery vehicles and weapons capable of destroying any conceivable combination of second-strike targets within the other's territory (12)."

This is the essence of nuclear deterrence, and as such, current force levels should have been satisfactory to both sides and the need for further modernization, expansion, or revision unnecessary.

A quantitative comparison of Soviet and American strategic forces in 1972 is contained in Table 5.1. At that time, the United States arsenal totalled 1,710 ICBMs and SLBMs capable of delivering 4,286 warheads, along with 455 strategic bombers (excluding the FB-111) (13). It is estimated that US strategic warheads totals numbered approximately 7,600 (14). On the Soviet side, ballistic missile numbers totalled 2,090, physically capable of delivering 4,610 warheads (assuming reports of a rudimentary 3-warhead capability for the SS-9 and SS-11 by 1972 were accurate (15), although it is unlikely the necessary warheads were available). Soviet bomber totals numbered 140 (excluding the TU-16 Badger) (16). Exact Soviet

TABLE 5.1

	US	USSR
ICBMs	1054	1530
SSBNs	41	61
SLBMs	656	560
Heavy Bombers	455	140
ICBM Warheads	1454	1530
SLBM Warheads	2832	560
Total Warheads	7600	2800

(from The Military Balance 1972-73)

strategic warhead totals are less well-known, but despite the throwweight capacities of their various SNDVs, Soviet

warhead stockpiles were estimated in the range of 2,800 (17).

Bearing in mind the view expressed by the IISS concerning the sufficiency of these forces in 1972, Table 5.2 offers a similar numerical comparison of superpower strategic forces in 1979. US ballistic missile forces numbered 1,710 launchers and 7,594 warheads (18). In addition, 574 bombers remained in the inventory (19). The American strategic nuclear warhead stockpile totalled approximately 12,500 (20). Soviet ICBMs and SLBMs totalled 2,348 capable of carrying up to 8,988 warheads (21). The Soviet strategic bomber force declined to 156 (22). The total strategic warhead arsenal of the USSR was estimated in the range of 7,500 (23).

Thus in sheer quantitative terms alone, it is clearly apparent that the strategic nuclear arms control process, as reflected in the terms of the SALT II final agreement, failed to place effective numerical ceilings on the

TABLE 5.2

	US	USSR
ICBMs	1054	1398
SSBNs	41	90
SLBMs	656	950
Heavy Bombers	574	156
ICBM Warheads	2154	5500
SLBM Warheads	5440	1400
Total Warheads	12500	7500

(from The Military Balance 1979-80 and World Weapons Database, Vol. 1: Soviet Missiles)

strategic forces of the two sides. Given that these forces were deemed sufficient at their 1972 levels to meet strategic doctrinal and political requirements for national security, the outcome of seven years of SALT II negotiations aimed at achieving the objective of "the earliest adoption of further limitations in strategic arms (24)" seems highly questionable when in purely numerical terms, the destructive capability of the forces as measured in deliverable warheads increased exponentially during the same period.

Assuming that the strategic doctrines of the two superpowers remained the assured survivability and retaliatory capability of these forces, the increase in numbers alone would not justify any erosion in confidence in military or crisis stability if such an increase was equal on both sides and did not undermine this survivability and retaliatory capability. Unfortunately, while launcher capacity and warheads totals increased dramatically, the counterforce target sets on both sides (i.e. the number of launchers and related facilities in the opponent's strategic arsenal) remained relatively static between 1972-79. If the theoretical destructive power of each country's strategic forces were to be exploited to the maximum in a first strike scenario, it is little wonder that strategic planners in both the US and USSR became increasingly concerned about the survivability of their respective nuclear forces, particularly the land-based ICBMs. SALT II clearly failed on this count in erroneously focussing on limitations in

SNDVs while allowing virtual unlimited expansion of overall warhead totals within the generous MIRVed SNDV sub-ceilings.

The rapid and dramatic expansion of MIRV capability was also the most visible indication of the significant qualitative improvements which also occurred during this period. A second test of SALT II's relevance to political/strategic, military/crisis and economic/arms race stability in the strategic sphere rests in the examination of its ability to limit or control this qualitative process. Annex 1 reviews the evolution of the major strategic systems available to the USSR and US in both 1972 and 1979 by comparing their relative technical characteristics. In analyzing this evolution, eleven separate quantitative and qualitative criteria were assembled to analyze combined delivery vehicle/warhead performance to determine the effect of each aspect on military/crisis stability. On the basis of these criteria, ranging from accuracy to reliability to destructive power, an "overall stability effect factor" could be assigned to each system indicating the sum total effect, positive or negative, of the particular system's characteristics. The contributions made to strategic stability by existing systems upgraded over the seven-year period, and new systems brought on stream to replace older ones, are revealing.

Obviously, the most important development during the period in the composition and structure of superpower strategic forces was the perfection of MIRVed ballistic

missiles. US MIRVs pre-dated the SALT II negotiations (25). Despite the US assumption of a large lead in MIRV technology, however, the USSR had as early as 1972 demonstrated a rudimentary multiple warhead capability for its SS-9 and 11 ICBMs (26), and tested its first fully capable MIRV in early 1975. By the end of the decade, the Soviets had not only deployed their own MIRVed ICBMs and SLBMs, but had tested the SS-18 for up to 20 warheads (27). In 1972, 57 per cent of the US ballistic missile force and 40 per cent of the Soviet force could be considered to have MIRV potential. By 1979, these figures were 70 per cent and 83 per cent respectively.

MIRVing promoted instability by consolidating a large number of warheads on a relatively few land-based missiles or submarines, offering a tempting target of a first-strike by an unscrupulous attacker. SALT II not only failed to address the MIRV issue from the outset in terms of halting their future development, but the final terms of the treaty actually codified the proliferation of MIRVed systems which occurred during the period of the negotiations, and left the door open for still further proliferation, e.g. future substitution of the 10-warhead MX ICBM for the single-warhead Titan II and Minuteman II. It was equally unfortunate and potentially dangerous that no agreement was reached on limitations in throwweight capacity in the context of evolving MIRV capability, given the huge lift capacity of Soviet systems such as the SS-9 and SS-18 ICBMs.

The "cap" achieved on "heavy" ICBMs merely recognized existing deployments of such missiles and did not address either their warhead capacity or warhead capabilities.

Other less evident, but equally significant technological developments in warhead and ballistic missile technology occurred during this period. Ballistic missile warhead accuracy increased dramatically. Deployment of the Mark 12A warhead for the Minuteman III was begun in 1979, improving the accuracy of that system from its 1972 capability of 1,500 feet circular error probable (CEP) to less than 1,000 feet CEP (28). The accuracy of the Trident C4, first deployed in October, 1979, increased US SLBM accuracy to 1,000-1,200 feet CEP from the 3,000 feet CEP capability of the Polaris A-3 SLBM, the mainstay of the US sea-based strategic forces in 1972 (29). This began the movement of submarine-based systems into the realm of counterforce capability from their previous less provocative counter-value role. Warhead capability and manoeuvrability also increased through the development and deployment of successive new generations of warheads during the decade. In the area of SLBMs, for example, US systems evolved successively from the Mk-100 warhead (9,000 feet CEP) atop the Polaris A-2 through the Mk-200 (3,000 feet CEP) for the Polaris A-3 and the Mk-300 (1,500 feet CEP) and Mk-400 (1,000 feet CEP) warheads used with the Poseidon and Trident I (30). Even more spectacular gains in accuracy were registered by the USSR which had farther to come in

modernizing or replacing their crude first generation systems, where one can compare the 9,000 feet CEP of the first generation SS-9 with the 600-feet CEP reported for the SS-18 whose deployment began in 1975 (31). While other definitive information on other qualitative developments by the Soviets, such as warhead development, is more scanty from open sources, the results of Soviet test launches during the 1970s clearly revealed substantial qualitative improvements in delivery vehicle and warhead capabilities at least equal to US developments.

Indeed, the deployment of new and more capable ICBMs and SLBMs by both sides continued unabated during the 1970s. The USSR deployed eleven new or modified ballistic missiles during the period; the US two (32). In all, both sides had deployed a combination of twenty-six separate or modified strategic carriers or delivery vehicles in 1972 (Table 5.3). By 1979, this number had jumped to forty-seven.

Granted, not all technological developments were detrimental to stability and security. In addition to the increased accuracy of missiles, significant advances were made in increasing ballistic missile range, particularly for SLBMs. The 4,230 nautical mile (nm.) range of the Trident C4, for example, compared favourably to the limited 2,500-3,200 nm. capacity of the Poseidon (33). Improvements in rocket propulsion, particularly the transition from liquid to solid fuel, and in launch techniques, most notably the cold launch technique perfected by the Soviets, explored

useful new technological directions unencumbered by arms control restrictions which increased the survivability of such systems by improving reaction and launch times (34).

It can be equally argued, at the same time, that more

TABLE 5.3

	<u>1972</u>	<u>1979</u>
US		
	Titan II	Titan II
	Minuteman I/II/III	Minuteman II/III
	Polaris SSBN	Polaris SSBN
	Poseidon SSBN	Poseidon SSBN
	Polaris A2/A3	Polaris A3
	Poseidon C3	Poseidon C3
	B-52 D/F/G/H	B-52 D/F/G/H
		SRAM
USSR		
	SS-7	
	SS-8	
	SS-9	SS-9 Mod 1/2/4
	SS-11	SS-11 Mod 1/2/3
	SS-13	SS-13
		SS-17 Mod 1/2
		SS-18 Mod 1/2/3/4
		SS-19 Mod 1/2
	Golf I/Golf II SSBN	Golf I/II SSBN
	Hotel II SSBN	Hotel II/III SSBN
	Yankee SSBN	Yankee SSBN
		Delta I/II/III SSBN
	SS-N-4	SS-N-4
	SS-N-5	SS-N-5
	SS-N-6	SS-N-6 Mod 1/2/3
		SS-N-8 Mod 1/2
		SS-NX-17
		SS-N-18 Mod 1/2/3
	Mya-4	Mya-4
	TU-95	TU-95
	AS-3	AS-3

(from The Military Balance 1972-73 and TMB 1979-80, and World Weapon Database, Vol. 1: Soviet Missiles)

capable systems increased the confidence of an attacker contemplating a first strike or pre-emption, whereas less capable weapons reduce the confidence of the attacker and act as a more suitable deterrent to precipitate action. Despite SALT II's restriction on the deployment of new ICBMs after 1979 to one per side, the lack of restrictions on research and development was reflected in the USSR's active testing of four new types of ballistic missiles in the 1970s in addition to updated versions of existing systems, while the US was investigating three new ballistic missiles. The transparency of SALT II's lack of teeth in controlling modernization was reflected in the controversy during the 1980s over the USSR's flagrant deployment of the SS-25, its justification being that this new ICBM was merely a modification of the existing SS-13 (35).

The other major technological development with which SALT II struggled unsuccessfully concerned the air-breathing leg of the strategic triad and in particular the development of cruise missiles. The beginnings of the sea-launched and air-launched versions of the cruise missiles currently found in the US inventory can, for example, be traced as back two decades, where they ironically coincided with the beginning of the SALT II process (36). The development of an enhanced air-breathing leg of the strategic triad continued unabated throughout the decade, with the negotiations themselves handicapped and undoubtedly prolonged by US unwillingness to negotiate away what it keenly hoped would this time prove

yet again, like MIRVs during SALT I, to be its technological Holy Grail. Warhead accuracy in the range of a few hundred feet, and the revolutionary nature of the cruise missile propulsion system offered further examples of the technological ingenuity of the military scientific community. As in the case of ballistic missiles, too, both the US and USSR were actively involved in the research and development of new bombers in addition to ALCM technology which drew upon the advances made in radar-evasion or "stealth" technology (37).

Much has been made about the contribution to be made to stability and security by a greater emphasis on the slow-flying air-breathing leg of the triad (38). Philosophically, there is much to be gained by such a shift, but in view of the phenomenal developments of air-breathing systems between 1972-79 from a few hundred slow, high-flying strategic bombers carrying relatively inaccurate free-fall bombs, to the idea of literally thousands of highly manoeuvrable, terrain-hugging cruise missiles capable of pin-point accuracy from ranges of over 2,000 nautical miles, concerns about stability and the necessity for agreed limits on such weapons must be raised, particularly when combined with the developments made in the other two legs of the triad described above during the same period.

The results of the Annex 1 analyses are summarized in Tables 5.4 and 5.5 which vividly illustrate the negative impact of these developments in superpower strategic

arsenals on stability and security. Consistently, newer systems deployed as replacements for older ones, such as the Minuteman III multiple warhead ICBM for the Minuteman I single warhead missile, the more accurate Poseidon SLBM for the Polaris A2/A3, the multiple warhead SS-18 for the single RV SS-9, the multiple warhead, increased accuracy SS-N-18 SLBM for the SS-N-4 and 5, or the 20-tube Delta ballistic missile submarine for its much smaller and less capable Hotel and Golf predecessors, all demonstrated new technical characteristics and capabilities which decreased rather than enhanced stability and security. In other cases, newer models of existing systems, such as the B-52 G/H bomber or the Delta III SSBN, displayed similar destabilizing characteristics.

Finally, all of these new or modified systems, although ostensibly replacing older systems on a one-for-one basis, nevertheless brought with them their enhanced MIRV capability resulting in an overall increase in sheer numbers of weapons, which as pointed out previously, had the diametrically opposite effects of both increasing first-strike capability and decreasing survivability. This might have been avoided had the focus of attention for modernization efforts been narrowed to the most stabilizing leg of the triad, i.e. slow-flying air-breathing systems, but this was not the case. Quite the opposite, the

greatest share of attention was given to improving ballistic missile/warhead capabilities, the area where the greatest asymmetries in force structures lay.

These results demonstrated that in 1972 bombers and submarines made the most positive contribution to arms control; SLBMs and ICBMs the least positive contribution. The surprising results for SLBMs, normally recognized as contributing positively to strategic stability, are directly

TABLE 5.4

US

		1972	1979
<u>ICBMs</u>			
Titan II		-	-
Minuteman I	◁	0	N/A
Minuteman II	◁	-	-
Minuteman III	◁	-	-
<u>SSBNs/SLBMs</u>			
Polaris/Poseidon SSBN		++++	++++
Polaris A2/A3	◁	0	-
Poseidon C3	◁	--	--
<u>Bombers/Cruise Missiles</u>			
B-52 D/F	◁	+++	+++
B-52 G/H	◁	++	++
SRAM		N/A	--

replacement for comparative effect on stability

(Note: The plus and minus symbols above represent the overall effect of each weapon system on strategic stability as drawn from the more detailed analyses contained in Annexes 1A and 1B. Asterisks indicate not yet deployed (in 1972) or withdrawn from service (by 1979))

related to the poor showing by these systems in the critical criteria of responsiveness, reliability, and C3, particularly in case of Soviet SLBMs (See Appendix 1B). Modernization, however, resulted in a deterioration in the overall effect of the strategic arsenals on stability in

TABLE 5.5

USSRICBMs

SS-7		---	*
SS-8	↖	-	*
SS-9		---	--
SS-11		--	--
SS-13		+	+
SS-17		*	---
SS-18	↖	*	-----
SS-19		*	---

SSBNs/SLBMs

Golf I SSB		++++	++++
Golf II SSB	↖	++++	++++
Hotel II SSBN		++++	++++
Yankee SSBN		++++	++++
Hotel III SSBN		*	+++
Delta I SSBN		*	++
Delta II SSBN	↖	*	++
Delta III SSBN		*	++
SS-N-4	↖	---	---
SS-N-5		--	--
SS-N-6		----	----
SS-N-8		*	--
SS-NX-17	↖	*	--
SS-N-18		*	-----

Bombers/Cruise Missiles

Mya-4	↖	++	++
TU-95	↖	+	+
AS-3		----	----

replacement for

comparative effect
on stability

almost all areas. The technological developments in ballistic missiles and warheads worsened the impact of ICBMs and SLBMs with newer models posing a greater threat to strategic stability than the earlier systems they replaced, such as the SS-18 for the SS-9. This was equally the case with regard to SSBN capability, i.e. the Delta series for the Golf, Hotel, and Yankee classes. Even in the most stabilizing leg of the triad, air-breathing systems, the move to the air-launched cruise missiles was a dangerous development. Once again, given the asymmetry in the force structures of the US and USSR, the uneven impact on each element of the strategic triad resulting from this technological development widened the asymmetry, and undermined strategic stability and security by further reinforcing the respective advantages of each side.

This in turn created an ever-increasing gap in their arms control objectives at the negotiating table and encouraged the kind of unbalanced negotiating postures adopted during SALT II which resulted in a compromise agreement having little effect on those aspects of their strategic rivalry which needed the greatest control.

All of these quantitative and qualitative developments were left unaddressed by the limitations "imposed" by the SALT II treaty. Ironically, technological improvements, combined with the quantitative increases in strategic offensive force levels, and improvements to C3 capabilities - all aimed one assumes at increasing the survivability and

therefore the deterrent capacity of these forces - also augmented their effectiveness as offensive weapons, and ultimately undermined the confidence of the two countries in the capacity of their strategic forces to meet military/crisis stability concerns. The treaty did not effectively cap those systems, especially MIRVed ballistic missiles, which posed the greatest threat. The evolution of the strategic forces exacerbated the existing asymmetry of these forces and in fact resulted in doctrinal shifts in the 1970s which further decreased rather than ameliorated the stability of the strategic environment, as seen in the changes in US strategic targetting enunciated by Schlesinger in 1974 and Carter's Presidential Directive 59 in 1980 (39). The strategic nuclear arms control process could have played a vital role in addressing these concerns, but for a variety of reasons, ranging from political ineptitude to the desire to maintain military advantage, failed to live up to expectations.

It can even be argued that force developments during the period of the SALT II negotiations operated completely independently from the negotiating process, and that this lack of linkage between the two calls into serious question the relevance of the latter. Rather than acting as a vehicle to control and guide the evolution of strategic forces, the SALT II negotiations, if not held hostage to these concurrent quantitative and qualitative developments, conceivably operated in a relative vacuum exerting minimal

influence on these developments, and therefore on strategic stability and international security as a whole. The inability of the SALT II process to effectively guide, if not limit the further development of strategic nuclear forces on both sides resulted in an undermining rather than an enhancement of deterrence and detracted from arms control's ultimate objective of military or crisis stability.

This in turn undermined political or strategic stability and resulted in disillusionment and the eventual demise of the SALT process. This disillusionment would also stimulate one of the largest defense-spending sprees in modern history by the United States in the subsequent decade, thus running counter to any notion that SALT II contributed to economic or arms race stability.

CHAPTER SIX

CONCLUSIONS AND PRESCRIPTIONS

This paper has attempted to achieve two objectives - (a) offer a justification for the development of a bilateral negotiating process between the United States and the Soviet Union aimed at effectively managing their nuclear competition, and (b) suggest that this arms control negotiating process produced less than satisfactory results.

The stimulus for the surprising interest displayed by both parties in a pluralist-oriented negotiating regime to deal with the most sensitive aspect of each country's national security - their nuclear forces - despite the continuing dominance of the realist approach to other aspects of their foreign policy pursuits, was the failure of the concept of nuclear deterrence to fully satisfy national goals and objectives. Faced with the reality of a highly dangerous, potentially unstable power whose relevance diminished even as the number of nuclear weapons continued to spiral, the US and USSR acknowledged the potential benefits offered by the negotiating process in mutually managing this power, rather than depending uniquely on deterrence to avoid conflict.

Their pursuit of arms control was originally intended to achieve strategic stability and international security on a number of levels. This was defined as the enhancement of military security through the reduction of the potential for crisis through agreed measures which would provide for the

safety, security, and survivability of their retaliatory nuclear forces. It further aimed at improving strategic (international) stability by normalizing if not necessarily improving the political relationship between the two. Finally, both sides saw the negotiating process as a source of potential economic benefits by reducing unwanted and unnecessary defence expenditures associated with an all out arms race in the nuclear sphere.

Based on these precepts, an analysis of the effectiveness of the strategic arms control negotiating process as epitomized by the SALT II negotiations and the 1979 agreement was the second objective of the paper, which sought to examine the outcome from the perspective of four hypotheses set out in chapter one.

In responding to the first hypothesis, there is no conclusive evidence that the SALT II agreement significantly influenced quantitative levels of strategic arms. On the contrary, the number of strategic nuclear delivery vehicles on either side remained relatively static after the massive build-up of the 1960s, indicating that optimum deployments had already been reached by the time the negotiations began. SALT II's token SNDV reductions, which were never implemented, would have had only the most marginal impact on Soviet strategic forces while leaving US SDNV levels untouched. In the other quantitative area of major importance, warheads, SALT II had no impact whatsoever as it failed to reduce the sub-limit on multiple warhead SNDVs

below current or projected deployments, allowing warhead totals on both sides to balloon well into the 1980s.

The overt technological evolution of these strategic forces which has been described clearly supports the second hypothesis, that qualitative improvements in these forces during the period of the negotiations were significant and had an important impact on the stability effect of these arsenals. As the discussion of the criteria for effective arms control attempted to establish, stability during the 1970s was a function of both the quantity and quality of the nuclear arms available to both sides. Numbers determined both the target set available for destruction in an attack and also the resources available to undertake such an attack.

At rough equality in the number of delivery vehicles, the quality of one's strategic forces became the critical variable in calculating the potential for success of such an attack. The inherently offensive nature of the quality factor also made it the most dangerous enemy to the stability of the relationship. The inability of SALT II to address this qualitative factor resulted in increased instability at the strategic level. The instability of the 1970s inherent in the first-strike hard target kill capability of the USSR's overwhelming superiority in ICBMs would subsequently swing in the other direction in the following decade with the introduction by the US of the highly accurate Trident D-5 SLBM, the uncontrolled

proliferation of sea- and air-launched cruise missiles, and the controversial re-emergence of strategic defences.

As a result of the ineffectiveness of SALT II to deal with these crucial issues, both sides were allowed to maintain and develop further their particular areas of advantage at the strategic level, exacerbating the existing asymmetries reflecting these areas of perceived advantage. Thus the final of the four hypotheses of this paper is supported - the issue of increased instability brought on by the continuing asymmetry of their strategic forces, an asymmetry further exacerbated by the lack of controls on qualitative improvement. Indeed, had SALT II resulted in greater symmetry, stability would have been enhanced even if the number of weapons was not significantly affected.

This raises two final questions. The first concerns why the final SALT II agreement was different (Fig. 4.2) from what the negotiators apparently wanted initially (Figs. 4.6 and 4.7). It can be argued that one reason was the different goals established by each side from the outside. The absence of common objectives made moot a final outcome which could completely satisfy both parties. Second, the very nature of the negotiating process itself dictates that through give and take, the parties to a negotiation will move off of their original bargaining positions. It may be natural for the end result of a negotiation to be different from its opening. Third, the achievement of a nation's objectives in any international negotiating process is

directly dependent upon the skill of its negotiators and their dedication to the process. While doubts may exist regarding the Soviet and American negotiating teams in either of these areas, particularly the latter, there is equally no clear condemning evidence to the contrary. This latter aspect, however, raises one last point which must be considered, that being that the final results were in fact exactly what either side anticipated and desired. Here, the issue of bargaining chips or deliberately non-negotiable positions enters into the issue of how the course and outcome of a negotiation such as SALT II may be affected. That the outcome of the negotiations differed from the beginning does not in itself indicate failure.

A corollary question, however, is whether the outcome met the criteria for effective arms control, and if not, why not? It has to be assumed that despite the competing domestic interests in both countries in favour of or opposed to arms control, the two superpowers as unitary actors on the international stage truly desired to effectively manage their strategic relationship. Each saw this goal through different filters resulting in different approaches to SALT II from the outset. These differences should not, however, in and of themselves have resulted in a poor agreement, assuming the commitment of both sides to a successful outcome. One is left therefore to ponder why the outcome was so poor, and wonder if the flaw was not in the process itself. This paper has postulated that this was indeed the

case, i.e. that both nations neglected to address a critical factor in the never-ending search for ultimate security - the imperative of technological development. The failure of SALT II, and indeed of START, to effectively deal with the continuing qualitative improvement of nuclear weapons left strategic arms control efforts an ineffective one-dimensional shadow of what it could have been had it dealt with qualitative and quantitative issues on an equal footing.

It remains to determine what lessons can be extracted from the SALT II experience. In the wake of the breathtaking changes which have occurred in the world just within the time frame encompassed by the preparation of this paper, it becomes increasingly easy to dismiss any study of the SALT II process as little more than a purely historical exercise of little relevance to today's international relations scholars. The tensions and antagonisms associated with the Cold War that two post-war generations came to commonly accept as the everyday norm seem already to have quickly faded into the mists of a time long past. New arms reduction proposals seem to emanate from the United States and the remnants of the Soviet empire on a weekly basis as the world hastens to dismantle the accoutrements of four decades of confrontation and rivalry between East and West, and struggles to come to grips with the structural changes implied in the characterization "the new world order."

The Strategic Arms Reduction Treaty signed by Presidents Bush and Gorbachev in 1991 has been regarded by some as the end of an era of arms control (1). Indeed, the era of difficult, decade-long negotiations resulting in minimalist agreements seems to have been replaced by a new penchant for unilateral almost impulsive disarmament initiatives which hold out important implications for those traditional post-war values which have become associated with the existence of large nuclear weapons stockpiles, such as deterrence versus conflict, war versus peace, confrontation versus cooperation, and force symmetry versus asymmetry.

The US strategic arsenal, for example, has unilaterally fallen from its peak of over 12,000 warheads in the mid-1980s to approximately 8,000 warheads today (2), quite independently of the unratified START agreement or any verifiable reciprocal actions by the USSR during the same period. This revelation results in a stark realization that strategic arms control may have been irrelevant to the international relations process all along. The end of the nuclear era may have in fact begun some time before the recent tumultuous events commonly identified as the impetus for the end of a superpower rivalry and bi-polar world based on a nuclear stand-off (3).

Despite these perceptions and developments, however, nuclear weapons have not gone away, any more than realism has been abandoned by major world leaders as the most

preferred means to achieve their ends. On the contrary, the horizontal proliferation in the number of confirmed nuclear weapons states has jumped from five to eight overnight as Belarus, the Ukraine and Kazakhstan flex their newly-inherited nuclear muscles. Anyone anticipating that this number may decrease just as quickly should examine carefully the most recent views of the Kazakhstan and Ukrainian Governments regarding their inherited nuclear arsenals (4).

Thousands of nuclear weapons remain worldwide. The disposal of weapons made redundant by unilateral disarmament efforts, and the disposition of remaining stockpiles without the benefits of established and agreed verification and inspection measures must raise serious concerns. The obvious verification difficulties associated with recent disarmament proposals, such as the "down-loading" of MIRVed missiles (5), or ICBM silo "deactivation" (6), underline the limits of unilateralism in ensuring an effective contribution to stability, particularly military/crisis stability, over the long term. Most serious of all, however, are the uncertainties associated with the status of the nuclear stockpile, nuclear industry, and nuclear know-how of the former USSR (7).

A significant role remains, therefore, for the formalized arms control negotiating regime created by the SALT/START process over the past twenty years. The future of the regime is, however, highly dependent upon the degree of faith placed by the current players in that negotiating

process as a contribution to national security and international stability. It is reassuring that US and Russian officials are already talking about the next set of negotiations to further reduce strategic forces on a mutual basis (8).

The best roadmap to the future lies in the study of the past. As established by this paper, the greatest flaw in the SALT II process as a precedent for any new great power negotiations was the inability of the process to control the qualitative aspect of superpower strategic arsenals. The mistake was repeated in the START Agreement which, while finally resulting in significant quantitative reductions, allowed for unrestricted modernization. Until the will or the means exists to control further technological developments in nuclear weaponry, efforts to achieve the ultimate goal of a nuclear weapons-free world are doomed to failure.

This demands a second look at the validity of the existing criteria identified with arms control stability if the model developed as a result is to prove useful as a policy prescriptive mechanism for political and military decision-makers. In the view of the author, the key lies in a re-examination of the economic/arms race leg of the arms control stability triangle, and in particular the issue of technological development.

Whatever the source of one's thinking about the origins of technological development, the apparent lack of an

interrelationship between the "control" of arms and the development of new weapons as symbolized by the example of SALT II suggests a need to revisit this aspect in the context of the arms control in both theory and practice. The justification of previous authors for the existing economic/arms race leg of the model appears to have ignored a number of variables independent from the competitive inter-state relationship which could explain weapons development and modernization. Separating these two aspects into individual legs of a new three-dimensional arms control model could offer increased explanatory power and therefore increased effectiveness for arms control policy-makers and theorists as a tool for pursuing useful and relevant arms control initiatives.

Finding the equilibrium point in this new more robust three-dimensional process becomes an undertaking of considerably more complexity, but potentially more rewarding both as an analytical and a policy prescriptive tool. Including a uniquely technological leg of the model allows for greater reflection on the variety of forces which drive weapons development and which have remained largely unaddressed in most arms control discussions to date.

This more comprehensive approach, had it been employed, may have assisted the SALT II negotiators in their struggle to control both the qualitative and quantitative aspects of the superpower nuclear rivalry. More importantly, one hopes it could be employed by future arms control negotiators

faced with the continuing Promethean task of managing the progeny of that rivalry, which threatens us today in more ways than either party could have imagined at the time.

APPENDIX 1

CRITERIA FOR COMPARISON OF TECHNICAL CHARACTERISTICS

For the purpose of testing the effectiveness of the SALT II agreement in addressing qualitative aspects in the strategic nuclear forces of the US and USSR which could contribute to increased instability and insecurity, the main physical characteristics of the major strategic systems of both sides were analyzed in 11 separate qualitative categories. A sliding quantitative scale (from low numbers to high numbers) was established for each qualitative category as a means of measuring each system's performance in terms of these 11 main criteria. The numerical standards (grouped as low, average, and high) for each category are indicated in the first table below.

From each weapon system's performance against these numerical standards, a judgement could then be rendered as to the positive (+) or negative (-) impact of the system's technical characteristics on strategic stability. In some categories, e.g. speed, a low result is consistent with a contribution to strategic stability (+), while a high result (-) is detrimental. In other categories, e.g. range, the opposite is true with a low result having a negative impact on stability and a high result being a contributing factor. These positive or negative determinations for each qualitative category are indicated in the second table below.

Numerical Standards for Quantitative Range

	<u>low</u>	<u>average</u>	<u>high</u>
1. <u>speed</u> (time to target)	several hrs	a few hrs	minutes
2. <u>weapon accuracy</u> (CEP)	1 mi or more	1000-5000 ft	1-1000 ft
3. <u>penetrivity</u> (ability to evade defences)	highly susceptible to defences	moderately susceptible	little/no no defence possible
4. <u>survivability</u> (basing mode)	fixed/above ground	fixed/below ground	fully mobile or submerged
5. <u>responsiveness</u> (to launch command)	hours; hot launch, unstorable liquid fuel	tens of min.; hot launch, storable liquid fuel	minutes; cold launch, solid fuel
6. <u>reliability</u> (% of force available for short notice launch)	0-30	31-60	61-100
7. <u>C3</u> (ability to control after launch)	no destruct on command capability; no recall	destruct on command; VLF/ELF recall	HF-band recall
8. <u>numbers</u>	1-50	51-100	>100
9. <u>warheads</u> (per vehicle)	1	2-5	>5
10. <u>range</u> (mi.)	<5000	5001-7000	>7000
11. <u>cumulative destructive power</u> (mgtns.)	<0.5	0.5-1.0	>1.0

Once these analytic criteria were established, each of the major strategic systems available to either superpower at the beginning of the SALT II process in 1972 and at its end in 1979 could then be examined comparatively (in the matrices

which follow), the Overall Stability Effect Factor for each system determined (by averaging the results of the 11 categories), and a comparison made between the Overall Stability Effect Factors for 1972 and 1979. Where the contribution of a particular weapon system to strategic stability declined during this period, it is logical that the negotiations should have addressed this development.

<u>Qualitative Criteria</u>	<u>Quantitative Range</u>	<u>Stability Effect</u>
1) speed	low to high	+ to -
2) weapon accuracy	low to high	+ to -
3) penetrivity	low to high	+ to -
4) survivability	low to high	- to +
5) responsiveness	low to high	- to +
6) reliability	low to high	- to +
7) C3	low to high	- to +
8) numbers	low to high	+ to -
9) warheads	low to high	+ to -
10) range	low to high	- to +
11) destructive power	low to high	+ to -

Source material for the determination of the characteristics of the weapons systems included in Appendix 1 is listed at the end of the bibliography to this paper.

COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

UNITED STATES

SYSTEM: Titan II ICBM

	1972	1979
speed	high (-)	high (-)
weapon accuracy	low (+)	low (+)
penetrivity	high (-)	high (-)
survivability	average (0)	average (0)
responsiveness	average (0)	average (0)
reliability	average (0)	average (0)
C3	low (-)	low (-)
numbers	average (0)	average (0)
warheads	low (+)	low (+)
range	high (+)	high (+)
destructive power	high (-)	high (-)

OVERALL STABILITY
EFFECT FACTOR

(-)	(-)
-----	-----

COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

UNITED STATES

SYSTEM: Minuteman I ICBM

	1972	1979
speed	high (-)	o
weapon accuracy	low (+)	u
penetrivity	high (-)	t
survivability	average (0)	o
responsiveness	high (+)	f
reliability	high (+)	s
C3	low (-)	e
numbers	high (-)	r
warheads	low (+)	v
range	high (+)	i
destructive power	high (-)	c

**OVERALL STABILITY
EFFECT FACTOR**

(0)	e
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

UNITED STATES

SYSTEM: Minuteman II ICBM

	1972	1979
speed	high) (-)	high (-)
weapon accuracy	average (0)	average (0)
penetrivity	high (-)	high (-)
survivability	average (0)	average (0)
responsiveness	high (+)	high (+)
reliability	high (+)	high (+)
C3	low (-)	low (-)
numbe·s	high (-)	high (-)
warheads	low (+)	low (+)
range	high (+)	high (+)
destructive power	high (-)	high (-)

OVERALL STABILITY
EFFECT FACTOR

(-)	(-)
-----	-----

COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

UNITED STATES

SYSTEM: Minuteman III ICBM

	1972	1979
speed	high (-)	high (-)
weapon accuracy	average (0)	average (0)
penetrivity	high (-)	high (-)
survivability	average (0)	average (0)
responsiveness	high (+)	high (+)
reliability	high (+)	high (+)
C3	low (-)	low (-)
numbers	high (-)	high (-)
warheads	average (0)	average (0)
range	high (+)	high (+)
destructive power	average (0)	average (0)

**OVERALL STABILITY
EFFECT FACTOR**

(-)	(-)
-----	-----

COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

UNITED STATES

SYSTEM: Polaris/Poseidon SSBN

	1972	1979
speed	low (+)	low (+)
weapon accuracy	low (+)	low (+)
penetrivity	average (0)	average (0)
survivability	high (+)	high (+)
responsiveness	high (+)	high (+)
reliability	average (0)	average (0)
C3	high (+)	high (+)
numbers	low (+)	low (+)
warheads	high (-)	high (-)
range	high (+)	high (+)
destructive power	high (-)	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

(++++)	(++++)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

UNITED STATES

SYSTEM: Polaris A2/A3 SLBM

	A2 1972	A3 1979
speed	high (-)	high (-)
weapon accuracy	low (+)	low (+)
penetrivity	high (-)	high (-)
survivability	high (+)	high (+)
responsiveness	high (+)	high (+)
reliability	high (+)	high (+)
C3	low (-)	low (-)
numbers	high (-)	high (-)
warheads	low (+)	average (0)
range	low (-)	low (-)
destructive power	average (0)	average (0)

OVERALL STABILITY
EFFECT FACTOR

(0)	(-)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

UNITED STATES

SYSTEM: Poseidon C3 SLBM

	1972	1979
speed	high (-)	high (-)
weapon accuracy	average (0)	average (0)
penetrivity	high (-)	high (-)
survivability	high (+)	high (+)
responsiveness	high (+)	high (+)
reliability	high (+)	high (+)
C3	low (-)	low (-)
numbers	high (-)	high (-)
warheads	high (-)	high (-)
range	low (-)	low (-)
destructive power	low (+)	low (+)

**OVERALL STABILITY
EFFECT FACTOR**

(--)	(--)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

UNITED STATES

SYSTEM: B-52 D/F Bomber

	1972	1979
speed	low (+)	low (+)
weapon accuracy	high (-)	high (-)
penetrivity	low (+)	low (+)
survivability	high (+)	high (+)
responsiveness	average (0)	average (0)
reliability	high (+)	high (+)
C3	high (+)	high (+)
numbers	high (-)	high (-)
warheads	average (0)	average (0)
range	high (+)	high (+)
destructive power	high (-)	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

(+++)	(+++)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

UNITED STATES

SYSTEM: B-52 G/H Bomber

	1972	1979
speed	low (+)	low (+)
weapon accuracy	high (-)	high (-)
penetrivity	low (+)	low (-)
survivability	high (+)	high (+)
responsiveness	average (0)	average (0)
reliability	high (+)	high (+)
C3	high (+)	high (+)
numbers	high (-)	high (-)
warheads	high (-)	high (-)
range	high (+)	high (+)
destructive power	high (-)	high (-)

OVERALL STABILITY
EFFECT FACTOR

(++)	(++)
------	------

COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

UNITED STATES

SYSTEM: SRAM

	1972	1979
speed	n	high (-)
weapon accuracy	o	high (-)
penetrivity	t	high (-)
survivability	d	high (+)
responsiveness	e	average (0)
reliability	p	high (+)
C3	l	low (-)
numbers	o	high (-)
warheads	y	low (+)
range	e	low (-)
destructive power	d	low (+)

**OVERALL STABILITY
EFFECT FACTOR**

	(--)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-7 ICBM

	1972	1979
speed	high (-)	o
weapon accuracy	low (+)	u
penetrivity	high (-)	t
survivability	average (0)	o
responsiveness	average (0)	f
reliability	average (0)	s
C3	low (-)	e
numbers	high (-)	r
warheads	low (+)	v
range	average (0)	i
destructive power	high (-)	c

OVERALL STABILITY
EFFECT FACTOR

(---)	e
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-8 ICBM

	1972	1979
speed	high (-)	o
weapon accuracy	low (+)	u
penetrivity	high (-)	t
survivability	average (0)	o
responsiveness	average (0)	f
reliability	average (0)	s
C3	low (-)	e
numbers	low (+)	r
warheads	low (+)	v
range	average (0)	i
destructive power	high (-)	c

OVERALL STABILITY
EFFECT FACTOR

(-)	e
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-9 ICBM

	Mod 1 1972	Mod 4 1979
speed	high (-)	high (-)
weapon accuracy	average (0)	low (+)
penetrivity	high (-)	high (-)
survivability	average (0)	average (0)
responsiveness	average (0)	average (0)
reliability	average (0)	average (0)
C3	low (-)	low (-)
numbers	high (-)	low (+)
warheads	low (+)	average (0)
range	high (+)	average (0)
destructive power	high (-)	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

(---)	(--)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-11 ICBM

	Mod 1 1972	Mod 3 1979
speed	high (-)	high (-)
weapon accuracy	low (+)	average (0)
penetrivity	high (-)	high (-)
survivability	average (0)	average (0)
responsiveness	average (0)	average (0)
reliability	high (+)	high (+)
C3	low (-)	low (-)
numbers	high (-)	average (0)
warheads	low (+)	average (0)
range	average (0)	average (0)
destructive power	high (-)	average (0)

**OVERALL STABILITY
EFFECT FACTOR**

(--)	(--)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-13 ICBM

	Mod 1 1972	Mod 2 1979
speed	high (-)	high (-)
weapon accuracy	low (+)	low (+)
penetrivity	high (-)	high (-)
survivability	average (0)	average (0)
responsiveness	high (+)	high (+)
reliability	high (+)	high (+)
C3	low (-)	low (-)
numbers	average (0)	average (0)
warheads	low (+)	low (+)
range	average (0)	average (0)
destructive power	average (0)	average (0)

OVERALL STABILITY
EFFECT FACTOR

(+)	(+)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-17 ICBM

	1972	Mod 3 1979
speed	n	high (-)
weapon accuracy	o	high (-)
penetrivity	t	high (-)
survivability	d	average (0)
responsiveness	e	high (+)
reliability	p	high (+)
C3	l	low (-)
numbers	o	average (0)
warheads	y	average (0)
range	e	average (0)
destructive power	d	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

	(---)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-18 ICBM

	1972	Mod 4 1979
speed	n	high (-)
weapon accuracy	o	high (-)
penetrivity	t	high (-)
survivability	d	average (0)
responsiveness	e	high (+)
reliability	p	high (+)
C3	l	low (-)
numbers	o	high (-)
warheads	y	high (-)
range	e	average (0)
destructive power	d	high (-)

OVERALL STABILITY
EFFECT FACTOR

	(-----)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-19 ICBM

	1972	Mod 2 1979
speed	n	high (-)
weapon accuracy	o	high (-)
penetrivity	t	high (-)
survivability	d	average (0)
responsiveness	e	high (+)
reliability	p	high (+)
C3	l	low (-)
numbers	o	high (-)
warheads	y	low (+)
range	e	average (0)
destructive power	d	high (-)

OVERALL STABILITY
EFFECT FACTOR

	(---)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: Golf I SSB

	1972	1979
speed	low (+)	low (+)
weapon accuracy	low (+)	low (+)
penetrivity	low (+)	low (-)
survivability	high (+)	high (+)
responsiveness	average (0)	average (0)
reliability	average (0)	average (0)
C3	high (+)	high (+)
numbers	low (+)	low (+)
warheads	average (0)	average (0)
range	low (-)	low (-)
destructive power	high (-)	high (-)

OVERALL STABILITY
EFFECT FACTOR

(++++)	(++++)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: Golf II SSF

	1972	1979
speed	low (+)	low (+)
weapon accuracy	low (+)	low (+)
penetrivity	low (+)	low (+)
survivability	high (+)	high(+)
responsiveness	average (0)	average (0)
reliability	average (0)	average (0)
C3	high (+)	high (+)
numbers	low (+)	low (+)
warheads	average (0)	average (0)
range	low (-)	low (-)
destructive power	high (-)	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

(++++)	(++++)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: Hotel II SSBN

	1972	1979
speed	low (+)	low (+)
weapon accuracy	low (+)	low (+)
penetrivity	average (0)	average (0)
survivability	average (0)	average (0)
responsiveness	average (0)	average (0)
reliability	average (0)	average (0)
C3	high (+)	high (+)
numbers	low (+)	low (+)
warheads	average (0)	average (0)
range	high (+)	high (+)
destructive power	high (-)	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

(++++)	(++++)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: Hotel III SSBN

	1972	1979
speed	n	low (+)
weapon accuracy	o	average (0)
penetrivity	t	average (0)
survivability	d	high (+)
responsiveness	e	average (0)
reliability	p	average (0)
C3	l	high (+)
numbers	o	low (+)
warheads	y	high (-)
range	e	high (+)
destructive power	d	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

	(+++)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: Yankee SSBN

	1972	1979
speed	low (+)	low (+)
weapon accuracy	low (+)	low (+)
penetrivity	average (0)	average (0)
survivability	average (0)	average (0)
responsiveness	average (0)	average (0)
reliability	average (0)	average (0)
C3	high (+)	high (+)
numbers	low (+)	low (+)
warheads	high (-)	high (-)
range	high (+)	high(+)
destructive power	high (-)	high (-)

OVERALL STABILITY
EFFECT FACTOR

(++++)	(++++)
--------	--------

COMPARISON OF TECHNICAL CHARACTERISTICS OF SO IET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: Delta I SSBN

	1972	1979
speed	n	low (+)
weapon accuracy	o	average (0)
penetrivity	t	high (-)
survivability	d	high (+)
responsiveness	e	average (0)
reliability	p	average (0)
C3	l	high (+)
numbers	o	low (+)
warheads	y	high (-)
range	e	high (+)
destructive power	d	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

	(++)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: Delta II SSBN

	1972	1979
speed	n	low (+)
weapon accuracy	o	average (0)
penetrivity	t	high (-)
survivability	d	high (+)
responsiveness	e	average (0)
reliability	p	average (0)
C3	l	high (+)
numbers	o	low (+)
warheads	y	high (-)
range	e	high (+)
destructive power	d	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

	(++)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: Delta III SSBN

	1972	1979
speed	n	low (+)
weapon accuracy	o	average (0)
penetrivity	t	high (-)
survivability	d	high (+)
responsiveness	e	average (0)
reliability	p	average (0)
C3	l	high (+)
numbers	o	low (+)
warheads	y	high (-)
range	e	high (+)
destructive power	d	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

	(++)
--	------

COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-N-4 SLBM

	1972	1979
speed	high (-)	high (-)
weapon accuracy	low (+)	low (+)
penetrivity	high (-)	high (-)
survivability	high (+)	high (+)
responsiveness	low (-)	low (-)
reliability	low (-)	low (-)
C3	low (-)	low (-)
numbers	low (+)	low (+)
warheads	low (+)	low (+)
range	low (-)	low (-)
destructive power	high (-)	high (-)

OVERALL STABILITY
EFFECT FACTOR

(---)	(---)
-------	-------

COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-N-5 SLBM

	1972	1979
speed	high (-)	high (-)
weapon accuracy	low (+)	low (+)
penetrivity	high (-)	high (-)
survivability	high (+)	high (+)
responsiveness	average (0)	average (0)
reliability	low (-)	low (-)
C3	low (-)	low (-)
numbers	low (+)	average (0)
warheads	low (+)	low (+)
range	low (-)	low (-)
destructive power	high (-)	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

(--)	(---)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-N-6 SLBM

	Mod 1 1972	Mod 3 1979
speed	high (-)	high (-)
weapon accuracy	low (+)	low (+)
penetrivity	high (-)	high (-)
survivability	high (+)	high (+)
responsiveness	average (0)	average (0)
reliability	low (-)	low (-)
C3	low (-)	low (-)
numbers	high (-)	high (-)
warheads	low (+)	average (0)
range	low (-)	low (-)
destructive power	high (-)	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

(----)	(----)
--------	--------

COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-N-8 SLBM

	1972	Mod 2 1979
speed	n	high (-)
weapon accuracy	o	average (0)
penetrivity	t	high (-)
survivability	d	high (+)
responsiveness	e	average (0)
reliability	p	average (0)
C3	l	low (-)
numbers	o	high (-)
warheads	y	low (+)
range	e	average (0)
destructive power	d	average (0)

OVERALL STABILITY
EFFECT FACTOR

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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-NX-17 SLBM

	1972	1979
speed	n	high (-)
weapon accuracy	o	average (0)
penetrivity	t	high (-)
survivability	d	high (+)
responsiveness	e	average (0)
reliability	p	low (-)
C3	l	low (-)
numbers	o	low (+)
warheads	y	low (+)
range	e	low (-)
destructive power	d	average (0)

OVERALL STABILITY
EFFECT FACTOR

	(--)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: SS-N-18 SLBM

	1972	Mod 3 1979
speed	n	high (-)
weapon accuracy	o	average (0)
penetrivity	t	high (-)
survivability	d	high (+)
responsiveness	e	average (0)
reliability	p	average (0)
C3	l	low (-)
numbers	o	high (-)
warheads	y	high (-)
range	e	low (-)
destructive power	d	average (0)

OVERALL STABILITY
EFFECT FACTOR

	(-----)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: Mya-4 Bomber

	1972	1979
speed	low (+)	low (+)
weapon accuracy	high (-)	high (-)
penetrivity	high (-)	high (-)
survivability	average (0)	average (0)
responsiveness	average (0)	average (0)
reliability	high (+)	high (+)
C3	high (+)	high (+)
numbers	low (+)	low (+)
warheads	average (0)	average (0)
range	high (+)	high (+)
destructive power	high (-)	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

(++)	(++)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: TU-95 Bomber

	1972	1979
speed	low (+)	low (+)
weapon accuracy	high (-)	high (-)
penetrivity	high (-)	high (-)
survivability	average (0)	average (0)
responsiveness	average (0)	average (0)
reliability	high (+)	high (+)
C3	high (+)	high (+)
numbers	average (0)	average (0)
warheads	average (0)	average (0)
range	high (+)	high (+)
destructive power	high (-)	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

(+)	(+)
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COMPARISON OF TECHNICAL CHARACTERISTICS OF SOVIET AND
AMERICAN STRATEGIC NUCLEAR DELIVERY SYSTEMS 1972 & 1979

SOVIET UNION

SYSTEM: AS-3 ALCM

	1972	1979
speed	high (-)	high (-)
weapon accuracy	average (0)	average (0)
penetrivity	high (-)	high (-)
survivability	average (0)	average (0)
responsiveness	average (0)	average (0)
reliability	high (+)	high (+)
C3	low (-)	low (-)
numbers	high (-)	high (-)
warheads	low (+)	low (+)
range	low (-)	low (-)
destructive power	high (-)	high (-)

**OVERALL STABILITY
EFFECT FACTOR**

(-----)	(-----)
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NOTES

Chapter Two

1. Horizontally, the number of confirmed nuclear weapons states has now increased to eight. Several others, including India, Israel, Pakistan, Brazil, Argentina, the two Koreas, and Taiwan are assumed either to have existing arsenals or a rudimentary weapons production capability ("U.S. convinced Pakistan has N-bomb, senator says", Ottawa Citizen, Southam Inc., Ottawa, 14 Jan. 1992, p.A6). Iran has recently been reported as having purchased nuclear warheads from the Commonwealth of Independent States ("Iran purchased nuclear weapons from Soviet republic", Ottawa Citizen, 24 Jan. 1992, p.A6). Vertically, US and Soviet warhead totals rose from 2 (US) weapons in 1945 to an estimated 55,000 by 1989 (The Bulletin of Atomic Scientists, Educational Foundation for Nuclear Science Inc., Chicago, Vol.45, No.9, Nov. 1989, p.53).
2. Levinger, G., "The Limits of Deterrence: An Introduction", Journal of Social Issues, op. cit., p.1.
3. See Schelling, Micromotives and Macrobehaviour, W.W. Norton & Co., New York, 1978.
4. Since last fall's UN General Assembly were 5 new nations were admitted, a further 14 countries have appeared as a result of the disintegration of the USSR and Yugoslavia. Active separatist movements exist in over a dozen other countries, including Canada. Olympic movement President Samaranch estimates as many as 200 countries by 1996 ("IOC will limit number of athletes", Ottawa Citizen, 8 Feb. 1992, p.C1).
5. George, A., and Smoke, R., Deterrence in American Foreign Policy: Theory and Practice, Columbia University Press, New York, 1974, p.72.
6. Deutsch, K., The Analysis of International Relations, Prentice Hall Inc., Englewood Cliffs, 1988, p.161; and Huth, P. and Russett, B., "What Makes Deterrence Work", World Politics, Princeton University Press, Princeton, Vol.XXXVI, No.4, 1984, p.496.
7. Jervis, R., "Deterrence Theory Revisited", World Politics, Vol.XXXI, No.2, 1979, p.289.
8. Ibid, p.291.
9. Brodie, B., (ed.), The Absolute Weapons, Harcourt, Brace and Co., New York, 1946, p.74.

10. Gilpin, Bueno de Mesquita, and Rapoport, among others, have explored the capability of state leaders for rational calculation of optimal expected utility probabilities in selecting appropriate courses of action (Gilpin, R., War and Change in World Politics, Cambridge University Press, New York, 1981, pp.18-23; Bueno de Mesquita, B., The War Trap, Alpine Press, South Braintree, 1981, and Rapoport, A., The Origins of Violence: Approaches to the Study of Conflict, Paragon House, New York, 1989, p.280).
11. Maxwell, S., "Rationality in Deterrence", Adelphi Paper 50, International Institute for Strategic Studies, London, 1968, p.1.
12. Schelling, The Strategy of Conflict, Oxford University Press, London, 1966, p.6.
13. Jervis, op. cit., p.292.
14. Quester, G.H., The Future of Nuclear Deterrence, Lexington Books, Lexington et al, 1986, p.XI.
15. Brodie, op. cit.
16. Jervis, op. cit., p.301.
17. For greater insight into the pluralist perspective, see Rosecrance, R., The Rise of the Trading State, Basic Book Inc., New York, 1986; Keohane, R.O., and Nye, J., Transnational Relations and World Politics, Harvard University Press, Cambridge, 1972; and Haglund, D., and Hawes, M.K., World Politics: Power, Interdependence, and Dependence, MacMillan Press of Canada, Toronto, 1990, passim.
18. See Young, O.R., International Cooperation, Cornell University Press, Ithaca et al, 1989; and Bennett, A.L., International Organizations: Principles and Issues, Prentice Hall, Englewood Cliffs, 1988, passim.
19. G. Allison's The Essence of Decision-making: Explaining the Cuban Missile Crisis (Little, Brown and Co., Boston, 1971) remains the standard for alternative explanations to the rational actor model (see Chap. 1, 3, and 5). See also Linblom, C., "The Science of Muddling Through", Public Administration Review, Journal of the American Society for Public Administration, Chicago, Vol.XIX, No.2, 1959, pp.79-88; Pratt, C. "Dominant Class Theory and Canadian Foreign Policy: The Case of the Counter Consensus", International Journal, Canadian Institute for International Affairs, Toronto, Vol.XXXIX, 1983-84, pp.99-135; Milibrand, R., and Poulantzas, N., "The Problem of the Capitalist State", in Blackburn, R., Ideology in Social Science, Fontana/Collins, Bungay, 1972, pp.238-64; and Etzioni, A., "Mixed Scanning: A

Third Approach to Decision-making, Public Administration Review, Vol.XXVII, No.5, 1967, pp.385-92.

20. Jervis, op. cit., p.292.

21. According to M. Bundy, the term MAD was first coined by noted defence analyst Donald Brennan in 1972 (Bundy, M., Danger and Survival: Choices About the Bomb in the First Fifty Years, Vintage Books, New York, 1990, pp.552-53). Nathan and Oliver, however, quote Robert MacNamara's use of the term as early as 1968 (Nathan, J.A., and Oliver, J.K., United States Foreign Policy and World Order, Scott, Foresman and Co., Glenview, 1989, p.309.

22. Lebow and Stein, "Beyond Deterrence", Journal of Social Issues, Plenum Publishing, New York, Vol.43, No.4, 1987, p.6.

23. For insight into the scientific approach to theory development and verification, see Rapoport, "Various Meanings of Theory", American Political Science Review, George Banta Co., Menasha, Vol.LII, No.4, 1958, pp.372-86; Philips, W., "Where Have All the Theories Gone?", World Politics, Vol.XXVI, No.2, 1972, pp.155-88; Ball, T., "From Paradigms to Research Programmes", American Journal of Political Science, University of Texas Press, Austin, Vol.XX, No.1, 1976, pp.159-66; and Schrag, C., "Philosophical Issues in the Science of Sociology", Sociology of Sociological Research, (photocopy), pp.369-370.

24. Bryson, R., Forbes, Forbes Inc., New York, 25 Dec. 1989, p.99.

25. Von Clausewitz, in his treatise On War, saw political objectives as being the real motive for war. These in turn determined the military objective to be achieved and the degree to which war is to be pursued to achieve it.

26. Bertram, C., "The Future of Strategic Deterrence: Vol.1, Adelphi Paper 160, International Institute for Strategic Studies, London, p 1.

27. Sonnenfeldt remarked that "security is not a fixed or quantifiable condition ... but is in many respects a state of mind." (Sonnenfeldt, H., "Soviet Perspectives on Security", in Laird, R.F., and Hoffman, E., Soviet Foreign Policy in a Changing World, Aldine Publishing Co., New York, 1980, p.219) Much of the Soviet preoccupation with security issues predates 1917 and is a reflection of traditional Russian and Slavic paranoia borne out of successive foreign invasions down through the centuries. For a particularly insightful look into the traditional roots of Soviet security policy, see Ulam, A., Expansion and Co-existence:

The History of Soviet Foreign Policy 1917-67, Praeger Press, New York, 1968.

28. Jacobsen, C.G., Soviet Foreign Policy: New Dynamics. New Themes, MacMillan Press, Houndmills et al, 1989, p.53.

29. Bundy, op. cit., pp.229-230.

30. Ibid, p.24.

31. Ibid, p.291.

32. Bertram, op. cit., p.2.

33. Miller, J.N., Jr., "Zero and Minimal Nuclear Weapons", in Nye, J., Allison, G., and Carnesale, A., (eds.), Fateful Visions, Ballinger Publishing Co., Cambridge, 1988, p.12.

34. Scheer, R., With Enough Shovels: Reagan, Bush and Nuclear War, Vintage Books, New York, 1983, pp.11-12.

35. Ibid, passim.

36. Garthoff, R., Soviet Military Doctrine, The Free Press, Glencoe, 1953, pp.174-77.

37. Holloway, D., "Military Power and Political Purpose in Soviet Policy", Soviet Foreign Policy in a Changing World, op. cit., p.249.

38. Sokolovsky, V.D., Military Strategy: Soviet Doctrine and Concepts, R. Garthoff (ed. and Trans.), Praeger Publishers, New York, 1963, passim.

39. McGwire, M., Military Objectives in Soviet Foreign Policy, The Brookings Institution, Washington, 1987, pp.23-29.

40. Stein, "Calculation, Miscalculation and Conventional Deterrence I: The View from Cairo", Jervis, R., Lebow, R.N., Stein, J.G., Psychology and Deterrence, The John Hopkins University Press, Baltimore et al, 1985, pp.34-59.

41. President Bush is reported to have rejected a recommendation from General N. Schwartzkopf that the 1991 Gulf War hostilities begin with the detonation of a nuclear device in the stratosphere over Iraq designed to disrupt Iraqi communications with a massive electromagnetic pulse (EMP). Revelations of the advanced state of Iraq's nuclear research and development programme indicate that while the country had no nuclear explosive capability, Scud missiles used during the war, matched with the stockpiles of nuclear material available to the regime, could have been employed

as effective radiological weapons had that nation so desired.

42. George and Smoke, op. cit., p.5.

Chapter Three

1. Demosthenes, "Phillipic III", in Saunders, A.N., (trans.), Greek Political Oratory, Penguin Books, Middlesex, 1970, p.252.

2. Burns, R. D., Arms Control and Disarmament: A Bibliography, ABC-Clio Inc., Santa Barbera et al, 1977, p.2.

3. "President Bush's initiatives on nuclear arms", NATO Review, NATO Office of Information and Press, Brussels, Oct. 1991, p.11; "Defence cuts highlight \$1.5 trillion U.S. budget", Toronto Star, Torstar, Toronto, 30 Jan. 1992, p.A14.

4. Aquinas, St. Thomas, "Human Acts" and "Law", Summa Theologica, Vol.2, in Pegis, A.C., (ed.), Basic Writings of St. Thomas Aquinas, Random House, New York, 1945, pp.225-365 and 742-816.

5. Such as the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous, or Other Gases, and of Bacteriological Methods of Warfare, signed in June, 1925, or the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, signed 10 October, 1980 (The UN Disarmament Yearbook, Vol.5, United Nations, New York, 1980, appendices I and VII).

6. Gaddis, J.L., "The Evolution of a Reconnaissance Satellite Regime", in George, A.L., Farley, P.J., and Dallin, A., U.S.-Soviet Security Cooperation: Achievements, Failures, Lessons, Oxford University Press, Oxford et al, 1988., pp.353-72.

7. The Canadian Encyclopedia, Second Edition, Vol. III, Hurtig Publishers, Edmonton, 1988, p.1902.

8. Goldblat, J., Agreements for Arms Control: A Critical Survey, Taylor and Francis, London, 1982, p.4.

9. Leonard, T.M., "'Keeping the Europeans Out': The US and Central America Since 1823", in Woodward, R.L., Jr., (ed.), Central America: Historical Perspectives on the Contemporary Crises, Greenwood Press, New York et al, 1988, p.12.

10. Robertson, S., "The CFE Treaty, An Assessment of Its Significance", Canadian Defence Quarterly, Vol. 20, No. 6, Baxter Publications, Toronto, 1991, pp.24-30.
11. Kissinger, H., "A Reagan-Gorbachev Summit: It Will Have to go Beyond Arms Control", Washington Post, Washington Post Co., Washington, 5 May 1985, p.C8.
12. Intriligator, M.D., and Brito, D.L., "On Arms Control", in Kolodziej, E.A., and Morgan, P.M., Security and Arms Control: Vol. 1: A Guide to National Policy-Making, Greenwood Press, New York et al, 1989, pp.213-215.
13. Bundy, M., Danger and Survival: Choices About the Bomb in the First Fifty Years, Vintage Books, New York, 1990, pp.155-96.
14. Schelling, T.C., and Halperin, M., Strategy and Arms Control, The Twentieth Century Fund, New York, 1961, p.142.
15. Bowie, R., "Basic Requirements of Arms Control", in Brennan, D.G., (ed.), Arms Control, Disarmament and National Security, George Braziller, New York, 1961, p.43.
16. Arms Control and Disarmament Agreements: Texts and Histories of Negotiations, United States Arms Control and Disarmament Agency, Washington, 1985, pp.28-33.
17. Intriligator and Brito, op. cit., p.215.
18. For a comprehensive discussion of regime theory, see "International Regimes", a special issue of International Organization, MIT Press, Cambridge, Vol. 36, No. 2, 1982.
19. Lebow, R.N., and Stein, J., "When Does Deterrence Succeed and How do We Know?", Occasional Paper 8, Canadian Institute for International Peace and Security, Ottawa, 1990, pp.69-73.
20. Soviet Military Power 1989: Prospects for Change, United States Department of Defense, Washington, 1989, pp.48-50.
21. Edwards, D.V., Arms Control in International Politics, Holt, Rinehart and Winston Inc., New York et al, 1989, p.3.
22. Krasner, S.D., "Structural Causes and Regime Consequences: Regimes as Intervening Variables", in International Regimes, op. cit., p.186.
23. Although the nuclear non-proliferation regime is commonly associated with the Non-proliferation Treaty (NPT) of 1970, the NPT is only one of four elements in a wider international regime aimed at impeding the spread of nuclear

weapons. The other three elements are composed of the international safeguards and inspection system operated by the International Atomic Energy Agency, national and multilateral export controls on sensitive material, equipment and technology, and international nuclear arms control and disarmament fora.

24. Schelling and Halperin, op. cit., p.142.

25. King, J.E., "Arms Control and US Security", in Henkin, L., (ed.), Arms Control, p.111.

26. Edwards, op. cit., pp.3-4.

27. Pfaltzgraff, R.L., Jr., "The Rationale for Superpower Arms Control", in Pfaltzgraff, R.L., Jr., and Kintner, W.R., (eds.), SALT: Implications for Arms Control in the 1970s, University of Pittsburgh Press, Pittsburgh, 1973, pp.17-18.

28. Nye, J., "The Role of Strategic Systems in Deterrence", Washington Quarterly, MIT Press, Washington, Vol.11, No.2, Spring 1988, pp.48-51.

29. Examples of the difficulties that the pluralism of the domestic decision-making process can cause are revealed in G. Allison's, The Essence of Decision-Making; Explaining the Cuban Missile Crisis, Little, Brown and Co., Boston, 1971; Rosecrance, R., "Deterrence and Vulnerability in the Pre-Nuclear Era", Adelphi Paper 160, International Institute of Strategic Studies, London, 1980; Stein, J., "Calculation Miscalculation, and Conventional Deterrence I: The View from Cairo" and Lebow, R. N., "Calculation, Miscalculation and Conventional Deterrence II: The View from Jerusalem", in Jervis, R., Lebow, and Stein, (eds.), Psychology and Deterrence, John Hopkins University Press, Baltimore, 1985.

30. In making the perceived growing vulnerability of the US to a Soviet first strike, the alleged "virtual disarming" of the United States during the 1970s, and suggested Soviet perfidity at the negotiating table, all major domestic themes in his 1980 election campaign, President Reagan severely limited his arms control options early on during his first term, even had he been seriously interested in new negotiations. It deceived the American public, upset Western allies, committed the US to a massive increase in defence spending it could ill afford, and insulted the very people he hoped to negotiate with - the USSR. This was not an auspicious beginning for START, which E. Muskie saw as "a secret agenda for sidetracking disarmament while the United States gets on with rearmament." (Scheer, R., With Enough Shovels: Reagan, Bush, and Nuclear War, Random House, 1982, p.84).

31. Talbott, S., Deadly Gambits Vintage Books, New York, 1985, pp.116-151.
32. See among others Caldwell, J., The Dynamics of Domestic Politics and Arms Control: The SALT II Treaty Ratification Debate, University of South Carolina Press, Columbia, 1991; Talbott, S., Endgame: The Inside Story of SALT II, Harper Torchbooks, New York, 1979; and Garthoff, R., "Mutual deterrence and Strategic Arms Limitation in Soviet Policy", in Lynn-Jones, S. M., Miller, S. E., and Van Evera, S., (eds.), Soviet Military Policy, MIT Press, Cambridge, 1989.
33. Schelling and Halperin, op. cit, p.1.
34. Snyder, J.L., "Perceptions of the Security Dilemma in 1914", Psychology and Deterrence, pp.167-79.
35. Schelling and Halperin, op. cit., Chap.1.
36. Statement delivered by US Secretary of State Shultz to Soviet Foreign Minister Schevardnadze in Moscow, March, 1988, (unpublished).
37. Report of a Conference on Permissive Action Links, Harvard Center of Science and International Affairs, Cambridge, Feb. 1986.
38. Following the introduction of flexible response as official NATO policy and strategy in 1967, disagreement among the allies over the mechanisms for authorizing the use of nuclear weapons forced the alliance to operate with only provisional political guidelines for nearly twenty years until adoption of formal General Political Guidelines (GPGs) was made possible in the late 1980s.
39. Intriligator and Brito, op. cit., p.216.
40. This view, expressed to the author by an anonymous British diplomat in the mid-1980s, encapsulated the dual Western European goals at the negotiations - increase stability in Europe by reducing the possibility of misunderstanding between the two alliances through active engagement, while preventing the unilateral withdrawal of US forces from the continent. Note that the reduction of military forces or even the desirability of an MBFR agreement is absent from these priorities.
41. Kaiser, K, "The NATO Strategy Debate After Reykjavik", in NATO Review, NATO Information Service, Brussels, Vol.34, No.6, Dec. 1986, pp.6-13.
42. The last-minute compromises made on ballistic missile submarines and intercontinental ballistic missile volumes in order to achieve the signing of the SALT I agreement are

well-documented in G. Smith's Doubletalk: The Story of SALT I, Doubleday and Co., Garden City, 1980, pp. 407-440. Dubious compromises on telemetry encryption and verification procedures were equally evident at the end of the SALT II process (Talbott, S., Endgame, op. cit., pp.256-78). Much less well-known is the negative impact on NATO security of the last-minute "double zero" option negotiated in connection with the INF treaty which left unaddressed the overwhelming superiority of the Warsaw Pact in short-range nuclear missiles (Soviet Military Power 1989, op. cit.).

43. Nye, op. cit., p.50.

44. Soviet mass production capacity is revealed in the 10-fold increase in Soviet ICBM deployments from 100 to 1,050 missiles in the 5 years between 1964-69; the 3-fold increase in SLBM deployments from 280 to 1,028 missiles from 1970-80; and the deployment of over 600 5,000 kilometer range SS-20 IRBMs between 1975-80. In each of these areas, US deployment levels remained static (The Military Balance TMB 1970-71; TMB 1980-81, International Institute for Strategic Studies, London, 1971 and 1981).

45. Edwards, op. cit. p.65.

46. Ibid, p.64.

Chapter Four

1. Arms Control and Disarmament Agreements: Texts and Histories of Negotiations, United States Arms Control and Disarmament Agency, Washington, 1985, pp.109-57.

2. "USSR-United States Statement of Agreed Principles for Disarmament Negotiations", Yearbook of the United Nations, UN Office of Public Information, New York, 1961, pp.10-13.

3. "Statement by President Eisenhower (on "Open Skies") to the Geneva Conference", 21 Jul. 1955, Public Papers of the Presidents - Dwight D. Eisenhower, United States Government Printing Office, Washington, 1955, p.713; "Letter (on cut-off in production of fissionable material for weapons purposes) from President Eisenhower to Chairman Bulganin, Soviet Council of Ministers", 6 Mar. 1956, Public Papers of the Presidents - Dwight D. Eisenhower, 1956, p.284; and "Text of Gromyko Announcement of the Soviet Decision to Suspend Nuclear Tests", New York Times, 1 Apr. 1958, New York Times Inc., New York, p.14.

4. A former high ranking Soviet military officer directly involved in the crisis recently suggested that Fidel Castro had actively advocated the use tactical nuclear weapons

against the United States had the US invaded Cuba as feared at the time.

5. President Kennedy was quoted after the crisis as believing that the possibility of nuclear war between the superpowers had been between one in three and fifty-fifty.

6. Arms Control and Disarmament Agreements: Texts and Histories of Negotiations, op. cit., pp.28-33 and 34-47.

7. Dupuy, T.N., and Hammerman, A Documentary History of Arms Control and Disarmament, Bowker, New York, 1973, p.52.

8. Epstein, W., The Last Chance: Nuclear Proliferation and Arms Control, The Free Press, New York, 1976, p.53.

9. Wolfe, T.W., The SALT Experience, Ballinger Publishing Co., Cambridge, 1979, p.1.

10. In 1964, the US held a superiority of 4:1 in intercontinental ballistic missiles alone. The strategic bomber ratio, also in the US favour, was even higher (4-5:1) (The Military Balance 1971, The International Institute for Strategic Studies, London, 1971).

11. Ballistic Missile Defence Technologies, Office of Technology Assessment, United States Congress, Washington, 1985. p.54.

12. Wolfe, op. cit., p.2.

13. Nathan, J.A. and Oliver, J.K., United States Foreign Policy and World Order, Scott Foresman and Co., Glenview et al, 1989, pp.309-310.

14. Halperin, M.H., "The Decision to Deploy the ABM: Bureaucratic and Domestic Politics in the Johnson Administration", World Politics, Princeton University Press, Princeton, Vol.25, No.1, 1972, p.63.

15. Ibid.

16. "Remarks by President Johnson at the Signing of the NPT", 1 July 1968, Public Papers of the Presidents - Lyndon B. Johnson, Book 2, United States Government Publishing Office, Washington, 1969, p.765.

17. Wolfe, op. cit., p.9.

18. Section 2 of Article 1 of the ABM Treaty, Arms Control and Disarmament Agreements: Texts and Histories of Negotiations, op. cit., p.139.

19. Section 2 of Article 15 of the ABM Treaty, *ibid*, p.142.

20. Article 1 of the Interim Agreement, *ibid*, p.150.
21. Barton, J.H., and Weiler, L.D., (eds.), International Arms Control: Issues and Agreements, Stanford University Press, Stanford, 1976, p.203.
22. Article 7 of the Interim Agreement, Arms Control and Disarmament Agreements: Texts and Histories of Negotiations, *op. cit.*, p.151.
23. See Garthoff, R., "SALT I: An Evaluation", World Politics, Princeton University Press, Princeton, Vol.31, No.1, October 1978, pp.1-25.
24. Farley, P., "Strategic Arms Control 1972-87", in George, A.L., Farley, and Dallin, A., (eds.), U.S.-Soviet Security Cooperation: Achievements, Lessons, Failures, Oxford University Press, Oxford et al, 1988, p.232.
25. Sullivan, D.S., "The Legacy of SALT: Soviet Deception and US Retreat", Strategic Review, U.S. Strategic Institute, Boston, Vol.7, No.1, Winter, 1979, pp.26-41.
26. "Congress approves SALT offensive arms agreement", Congressional Quarterly, Congressional Quarterly Inc., Washington, Vol.XXVIII, 1972, pp.622-625.
27. Garthoff, "Mutual Deterrence in Soviet Policy", in Lynn-Jones, S.M., Miller, S., and van Evera, S., (eds.), Soviet Military Policy, MIT Press, Cambridge, 1989, pp.177 and 197.
28. See Krell, G. and Lutz, D.S., "Arms Control from SALT I to SALT III", Osteuropa, Druckerei Georg Appel, Wemding, Vol.29, No.12, December 1979, pp.1008-1020.
29. "Ambassador G. Smith's Remarks at a Press Conference in Moscow", 26 May 1972, submitted in testimony before the House Committee on Armed Services, 25 July 1972, 92nd Congress, 2nd Session, H201-38, Congressional Information Service (CIS), Washington, 1972, pp.15083-15113.
30. Barnett, F., in Nitze, P. Dougherty, J.E., and Kane, F.X., The Fateful Ends and Shades of SALT: Past ... Present ... and Yet to Come?, Crane Russak and Co., New York, 1979, p.ix.
31. "Defence Secretary Laird's testimony before the Senate Committee on Foreign Relations", 21 June 1972, 92nd Congress, 1st Session, S381-26.2, CIS, 1972, pp.60-70.
32. Garthoff, "SALT I: An Evaluation", *op. cit.* p.10.

33. Rapoport, A., The Origins of Violence: Approaches to the Study of Conflict, Paragon House, New York, 1989, pp.168-170.
34. The debate during the Reagan Administration concerning the ABM Treaty would center around the relationship between Article V and Agreed Statement D of the treaty.
35. Labrie, R. P., SALT Handbook: Key Documents and Issues 1972-79, American Enterprise Institute for Public Policy Research, Washington, 1979, pp.13-14.
36. "Agreement on Basic Principles of Negotiations on Strategic Arms Limitation", 21 June 1973, Department of State Bulletin, Office of Media Services, US State Department, Washington, Vol.LXIX, No.1778, 23 July 1973, p.158; and the "Joint US-USSR Communiqué", 24 June 1973, *ibid*, pp.130-134.
37. "Press Conference by Dr. Kissinger", 21 June 1973, *ibid*, p.136.
38. *Ibid*.
39. Nitze, *op. cit.*, pp.37-38.
40. Wolfe, "Soviet Interests in SALT", in Pfaltzgraff, R.L. Jr., and Kintner, W.R., (eds.), SALT: Implications for Arms Control in the 1970s, University of Pittsburgh Press, Pittsburgh, 1973, pp.21-54.
41. Arms Control and Disarmament Agreements: Texts and Histories of Negotiations, *op. cit.*, pp.158-163.
42. Wolfe, The SALT Experience, p.94.
43. The Jackson Resolution was ultimately included in US Public Law 92-448 of 30 September 1972, which approved and authorized the President to accept the Interim Agreement.
44. Labrie, *op. cit.*, p.163.
45. Wolfe, The Salt Experience, *op. cit.*, pp.103-06.
46. Talbott, Endgame: The Inside Story of SALT II, Harper Torchbooks, New York et al, 1979, p.32.
47. Department of State Bulletin, Vol.LXXI, No.1852, 23 December 1974, p.879.
48. "Documents on Disarmament 1974", United States Arms Control and Disarmament Agency Publication 76, United States Government Printing Office, Washington, 1976, pp.772-779.

49. See the testimony related to "Vladivostok Accord: Implication to US Security, Arms Control, and World Peace", Hearings before the House Sub-committee on International Security and Scientific Affairs, 94th Congress, 1st Session, 24 and 25 June, 9 July 1975, H381-55, CIS, 1975, pp.151-198.
50. The Military Balance 1974-75, pp.73-75.
51. Wolfe, The SALT Experience, op. cit., 201.
52. Talbott, op. cit., p.37.
53. Labrie, op. cit., p.167.
54. Ibid.
55. Ibid, p.168.
56. Inaugural Address of President Carter", 20 January 1977, Public Papers of the Presidents - Jimmy Carter, Book 1 - Jan.-Jun. 1977, US Government Printing Office, Washington, 1977, p.3.
57. Talbott, op. cit., p.39.
58. "Press Conference of Dr. Z. Brzezinski, Assistant to the President for National Security Affairs", 1 Apr. 1977, transcript from the Office of the White House Press Secretary, Washington, 1977.
59. "Testimony of Mr. P. Warnke, Director of ACDA", to the Senate Committee on Foreign Relations, 8 Feb. 1977, 95th Congress, 1st Session, S381-10.1, CIS, pp.20-92 and 111-114.
60. Talbott, op. cit., p.147.
61. Fractionation refers to the ability of an SNDV to disperse multiple warheads, decoys, and/or penetration aids.
62. Talbott, op. cit.
63. See Semeiko, L., "SALT-2 Treaty: Priority of Political Aspects and Parity of Strategic Interests", Current Research on Peace and Violence, Tampere Peace Research Institute, Tampere, Vol.2, No.3, 1980, pp.118-125; Treverton, G.F., "The SALT II Agreement: Contents, Meaning, and Problems", Europa-Archiv, Graphischer Betrieb Kurt Weber, Bremen, Vol.34, No.15, 10 Aug. 1979, pp.451-60; Pierre, A.J., "The Diplomacy of SALT", International Security, MIT Press, Cambridge, Vol. 5, No.1, Summer 1980, pp.178-97; and Freedman, L., "SALT II and the Strategic Balance", The World Today, Royal Institute for International Affairs, London, Vol.35, No.8, August 1979, pp.315-23.

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64. Members of the Committee included such prominent individuals as Ronald Reagan, Kenneth Adelman, William Casey, John Connally, Fred Ikle, Max Kampelman, Jeanne Kirkpatrick, Claire Booth Luce, Edward Teller, Paul Nitze, George Shultz, and others - virtually the entire lineup of the Reagan Administration to follow.

65. Rostow, E.V., "SALT II: A Soft Bargain - A Hard Sell", Policy Review, The Heritage Foundation, Washington, Vol.6, Fall 1978, p.44.

66. Gray, C.S., "Strategic Forces and SALT: A Question of Strategy", Comparative Strategy, Crane, Russak and Co., New York et al, Vol.2, No.2, 1980, pp.113.

67. Thee, M., "Some Remarks on the SALT Agreements: Concerns of the Peace Research and Disarmament Communities", Current Research on Peace and Violence, Berger-Levrault, Neilly-sur-Seine, Vol.2, No.1, 1979, pp.12-19; and Huntzinger, J., "The True Story of SALT II or the Death of 'Arms Control'", Politique internationale, vol.4, été, 1979, pp.111-137.

68. Gerson, M.B., "What is the Strategic Arms Limitation Process Really All About?", International Relations, Journal of the D. Davies Memorial Institute of International Studies, London, Vol.VI, No.5, May 1980, pp.822-42.

Chapter Five

1. Freud, S., Civilization and Its Discontents, Joan Riviere (trans.), Hogarth Press, London, 1969, pp.28-29.

2. See Richardson, L.F., Statistics of Deadly Quarrels, Quadrangle Books, Chicago, 1960, passim; Boulding, K.E., "The Relations of Economic, Political, and Social Systems", in Singall, L.D., (ed.), Collected Papers: Vol.4, Associated University Press, Boulder, 1974, pp.151-62; and Wallace, M.D., "Arms Race and Escalation: Some New Evidence", Journal of Conflict Resolution, Sage Publications, Beverly Hills et al, Vol.23, No.1, March 1979, p.5.

3. See Wagner, D.L., Perkins, R.T., and Tagepera, R., "Complete Solution to Richardson's Arms Race Equations", Journal of Peace Research, World Friends Research Center, Philadelphia, Vol.1, No.1, 1975, pp.159-72; Rapoport, A., The Origins of Violence: Approaches to the Study of Conflict, Paragon House, New York, 1989, pp.168-170; and Craig, P.P., and Jungermann, J.A., Nuclear Arms Race: Technology and Society, McGraw-Hill Book Co., New York et al, 1986, passim.

4. See Weber, S., Cooperation and Discord in U.S. - Soviet Arms Control, Princeton University Press, Princeton, 1991.
5. Wagner, D.L., op. cit.
6. Evangelista, M., Innovation and the Arms Race: How the United States and the Soviet Union Develop New Military Technologies, Cornell University Press, Ithaca and London, 1988, p.X.
7. Thompson, E.P., "Notes on Exterminism: The Last Stage of Civilization", Exterminism and the Cold War, New Left Review, Verso, London, 1982, pp.1-34.
8. Eisenhower, D.D., Mandate for Change, Doubleday, Garden City, 1963, p.616.
9. See Florman, S.C., Blaming Technology: The Irrational Search for Scapegoats, St. Martin's Press, New York, 1981; Kreyche, G.K., "The Meaning of Humanness: A Philosophical Perspective", in Borchert, D., and Stewart, S., (eds.), Being Human in a Technological Age, Ohio University Press, Athens, 1979; Ellul, J., "The Technological System", Continuum, New York, 1980; Winner, L., Autonomous Technology: Technics Out-of-Control as a Theme in Political Thought, MIT Press, Cambridge, 1977; and Jalbert, J.E., "Phenomenology and the Autonomy of Technology", in Durbin, P.T., (ed.), Philosophy and Technology: Vol.3. Technology and Responsibility, D. Reidel Publishing Co., Dordrecht et al, 1987, passim.
10. Evangelista, op. cit., pp.261-268.
11. The total megatonnage of the US nuclear arsenal fell from an estimated high of 20,000 megatons in 1960 to 5,000 by 1985. Similarly, Soviet totals dropped from 17,000-19,000 megatons in the mid-1970s to 11,000-12,000 by 1985 (Cochran, T.B., Arkin, W.M., Norris, R.S., and Sands, J.I., Nuclear Weapons Databook: Vol.4 - Soviet Nuclear Weapons, Ballinger Books, Grand Rapids et al, 1989, p.43 (Fig.2.16).
12. The Military Balance 1972-73, The International Institute for Strategic Studies, London, 1973, p.86.
13. Ibid, pp.65-67.
14. "US and Soviet Strategic Nuclear Forces 1972-87", The Bulletin of the Atomic Scientists, Educational Foundation for Nuclear Science Inc., Chicago, Vol.44, No.4, May 1988, p.56.
15. The Military Balance 1972-73, op. cit., p.65.
16. Ibid, p.66.

17. The Bulletin of the Atomic Scientists, op. cit.
18. The Military Balance 1979-80, op. cit., p.86.
19. Ibid, p.88.
20. Cochran, Arkin, and Hoenig, M.M., Nuclear Weapons Databook: Vol. I - US Nuclear Forces and Capabilities, Ballinger Publishing Co., Cambridge, 1984, p.14 (Fig.1.3).
21. This calculation is based in the capability of the most modern version of each variety of missile in question and is a reflection of potential rather than actual deployment configuration.
22. The Military Balance 1979-80, op. cit., p.89.
23. The Bulletin of the Atomic Scientists, op. cit.
24. "Agreement on Basic Principles of Negotiations on Strategic Arms Limitation", 21 June 1973, Department of State Bulletin, Office of Media Services, US State Department, Washington, Vol.LXIX, No.1778, 23 July 1973, p.158.
25. The triple warhead Minutemen III ICBM was first deployed in 1970; the 10-warhead Poseidon SLBM the following year.
26. The Military Balance 1972-73, op. cit., p.67.
27. Labrie, R., SALT Handbook: Key Documents and Issues 1972-79, American Enterprise Institute for Public Policy Research, Washington, 1979, p.412.
28. The Military Balance 1979-80, op. cit., p.3. Circular Error Probable is a mathematical calculation which determines the radius of a circle within which 50 percent of the warheads targeted will land.
29. Cochran, Arkin, and Hoenig, op. cit., p.137; and The Military Balance 1979-80, ibid.
30. The Military Balance, ibid.
31. Ibid, p.87.
32. Wright, B., World Weapons Database: Vol.1 - Soviet Missiles, Lexington Books, Lexington, 1986, pp.54-55.
33. Cochran, Arkin, and Hoenig, op. cit., pp.142, 137.

34. The cold launch technology was particularly regarded as an effort to circumvent SALT I's restrictions on silo size, which in turn was aimed (unsuccessfully) at controlling missile size.

35. Soviet Noncompliance, United States Arms Control and Disarmament Agency, 1986, pp.7-8; and TASS statement of 11 Jun. 1985, Soviet Embassy, Ottawa, pp.1-2.

36. Cochran, Arkin, and Hoenig, op. cit., p.172.

37. The US Air Force's ambitious programme to reduce aircraft radar visibility to near zero which resulted in today's F-117A fighter bomber, the B-2 strategic bomber, and the advanced cruise missile was launched in the mid-1970s (Brown, A.S., "Stealth Comes of Age", Aerospace America, American Institute of Aeronautics and Astronautics, Washington, Vol.28, No.3, March 1990, p.18.

38. Troyano, T., "Strategic Bomber Modernization and START: An Analytical Framework", Strategic Review, US Strategic Institute, Boston, Summer 1989, p.46; and Brown, M.E., "B-2 or not B-2: Crisis and Choice in the US strategic bomber programme", Survival, International Institute for Strategic Studies, London, Jul./Aug 1988, p.352.

39. Bundy, M., Danger and Survival: Choices About the Bomb in the First Fifty Years, Vintage Books, New York, 1990, p.609.

Chapter Six

1. Krauthammer, C., "Why Arms Control is Obsolete", Time, Time Canada Ltd., Toronto, Vol.138, No.5, 5 Aug. 1991, p.52.

2. The Bulletin of the Atomic Scientists, Educational Foundation for Nuclear Science Inc., Chicago, Vol.48, No.1, Jan./Feb. 1992, p.49.

3. A strong hint of future directions in US strategic policy, largely unnoticed at the time but strongly evident in recent unilateral American decisions regarding its nuclear forces, was contained in Discriminate Deterrence, the report of the Blue Ribbon Commission on an Integrated Long-Term Strategy (United States Government Printing Office, Washington, 1988). One of the chief conclusions of the Commission was that greater attention should be paid to potential offered by emerging technologies for the development of intelligent strategic conventional weapons and the employment of surgical strikes similar to those employed during the Gulf War.

4. "Ukraine reconsiders nuclear policy", Globe and Mail, Thompson Newspaper Co. Ltd., Toronto, 30 March 1992, p.A7, and "Khazakhstan republic plans to keep strategic nuclear arms", Ottawa Citizen, Southam Inc., Ottawa, 10 April 1992, p.A5.
5. "État du désarmement nucléaire", Le Devoir, Montréal, 30 jan. 1992, p.A6.
6. Ibid.
7. "Russian warns of nuclear risks", Globe and Mail, 5 Feb. 1992, p.A7; "Khazakhstan not informed about test-firing of Missile", Globe and Mail, 22 Jan. 1992, p.A8; and "Iran purchased nuclear weapons from Soviet republic", report says", Ottawa Citizen, 24 Jan. 1992, p.A6.
8. "Yeltsin, Bush set to scrap missiles", Toronto Star, Torstar Corp. Toronto, 30 Jan. 1992, p.A14.

Annex 2

The hard data for the quantitative and qualitative comparisons of US and Soviet strategic weapons systems undertaken in this annex was drawn from:

1. Betts, G.C., and Jakubow, R.P., Nuclear Weapons Database, D Strat A Staff Note 86/12, Operational Research and Analysis Establishment, Department of national Defence, Ottawa, 1986.
2. Cochran, T.B., Arkin, W.M., and Hoenig, M.M., Nuclear Weapons Databook: Vol. I - US Nuclear Forces and Capabilities, Ballinger Publishing Co., Cambridge, 1984, p.14 (Fig.1.3).
3. Cochran, Arkin, Norris, R.S., and Sands, J.I., Nuclear Weapons Databook: Vol.4 - Soviet Nuclear Weapons, Ballinger Books, Grand Rapids et al, 1989.
4. Collins, J.M., US-Soviet Military Balance 1960-80: Concepts and Capabilities, McGraw-Hill Publications Co., New York, 1980.
5. Crawford, N., World Weapons Database: Vol.2 - Soviet Military Aircraft, Lexington Books, Lexington, 1987.
6. Davies, L. E., and Schilling, W.R., "All You Ever Wanted to Know About MIRV and ICBM Calculations But Were Not Cleared to Ask", Journal of Conflict Resolution, Vol. 17, No. 2, Sage Publications, Beverly Hills et al, Jun. 1973, pp.207-242.

7. , Jane's All The World's Aircraft 1971-72, Jane's Yearbooks, London, 1971.
8. , Jane's All the World's Aircraft 1979-80.
9. , Jane's Fighting Ships 1971-72, Jane's Publishing Co., London, 1971.
10. , Jane's Fighting Ships 1979-80.
11. , Jane's Weapons Systems 1979-80, Jane's Publishing Co., London, 1979.
12. , The Military Balance 1972-73, International Institute for Strategic Studies, London, 1973.
13. , The Military Balance 1979-80.
14. Richelson, J.T., "Evaluating the Strategic Balance", American Journal of Political Science, Vol. 24, No 4., University of Texas Press, Austin, Nov. 1980, pp.779-803; and "Static Indicators and the Ranking of Strategic Forces", Journal of Conflict Resolution, Vol. 26, No. 2, Sage Publications, Beverly Hills et al, Jun. 1982, pp.265-282.
15. Seiler, G., Strategic Nuclear Force Requirements and Issues, Air University Press, Maxwell Air Force base, 1983.
16. Wright, B., World Weapons Database: Vol.1 - Soviet Missiles, 1986.

BIBLIOGRAPHY

Aerospace America, American Institute of Aeronautics and Astronautics, Washington.

Allison, G., The Essence of Decision-making: Explaining the Cuban Missile Crisis (Little, Brown and Co., Boston, 1971).

American Political Science Review, George Banta Co., Menasha.

American Journal of Political Science, University of Texas Press, Austin.

Arms Control and Disarmament Agreements: Texts and Histories of Negotiations, United States Arms Control and Disarmament Agency, Washington, 1985.

Ballistic Missile Defence Technologies, Office of Technology Assessment, United States Congress, Washington, 1985.

Barton, J.H., and Weiler, L.D., (eds.), International Arms Control: Issues and Agreements, Stanford University Press, Stanford, 1976.

Bennett, A.L., International Organizations: Principles and Issues, Prentice Hall, Englewood Cliffs, 1988.

Bertram, C., "The Future of Strategic Deterrence: Vol.1, Adelphi Paper 160, International Institute for Strategic Studies, London.

Betts, G.C., and Jakubow, R.P., Nuclear Weapons Database, D Strat A Staff Note 86/12, Operational Research and Analysis Establishment, Department of national Defence, Ottawa, 1986.

Blackburn, R., Ideology in Social Science, Fontana/Collins, Bungay, 1972.

Borchert, D., and Stewart, S., (eds.), Being Human in a Technological Age, Ohio University Press, Athens, 1979.

Brennan, D.G., (ed.), Arms Control. Disarmament and National Security, George Braziller, New York, 1961.

Brodie, B., (ed.), The Absolute Weapons, Harcourt, Brace and Co., New York, 1946.

Bueno de Mesquita, B., The War Trap, Alpine Press, South Braintree, 1981.

Bulletin of Atomic Scientists, The, Educational Foundation for Nuclear Science Inc., Chicago.

Bundy, M., Danger and Survival: Choices About the Bomb in the First Fifty Years, Vintage Books, New York, 1990.

Burns, R. D., Arms Control and Disarmament: A Bibliography, ABC-Clio Inc., Santa Barbera et al, 1977.

Caldwell, D., The Dynamics of Domestic Politics and Arms Control: The SALT II Treaty Ratification Debate, University of South Carolina Press, Columbia, 1991.

Canadian Defence Quarterly, Baxter Publications, Toronto.

Canadian Encyclopedia, The, Second Edition, Vol. III, Hurtig Publishers, Edmonton, 1988.

Cochran, T.B., Arkin, W.M., Norris, R.S., and Sands, J.I., Nuclear Weapons Databook: Vol. 4 - Soviet Nuclear Weapons, Ballinger Books, Grand Rapids et al, 1989.

Cochran, T.B., Arkin, W.M., and Hoenig, M.M., Nuclear Weapons Databook: Vol. I - US Nuclear Forces and Capabilities, Ballinger Publishing Co., Cambridge, 1984.

Collins, J.M., US-Soviet Military Balance 1960-80: Concepts and Capabilities, McGraw-Hill Publications Co., New York, 1980.

Comparative Strategy, Crane, Russak and Co., New York et al.

Congressional Quarterly, Congressional Quarterly Inc., Washington.

Craig, P.P., and Jungermann, J.A., Nuclear Arms Race: Technology and Society, McGraw-Hill Book Co., New York et al, 1986.

Crawford, N., World Weapons Database: Vol. 2 - Soviet Military Aircraft, Lexington Books, Lexington, 1987.

Current Research on Peace and Violence, Berger-Levrault, Neilly-sur-Seine.

Current Research on Peace and Violence, Tampere Peace Research Institute, Tampere.

Department of State Bulletin, Office of Media Services, US State Department, Washington.

Deutsch, K., The Analysis of International Relations, Prentice Hall Inc., Englewood Cliffs, 1988.

Devoir, Le, Le Devoir Ltée., Montréal.

Discriminate Deterrence, Report of the Blue Ribbon Commission on an Integrated Long-Term Strategy, United States Government Printing Office, Washington, 1988.

"Documents on Disarmament 1974", United States Arms Control and Disarmament Agency Publication 76, United States Government Printing Office, Washington, 1976.

Dupuy, T.N., and Hammerman, A Documentary History of Arms Control and Disarmament, Bowker, New York, 1973.

Durbin, P.T., (ed.), Philosophy and Technology: Vol. 3. Technology and Responsibility, D. Reidel Publishing Co., Dordrecht et al, 1987.

Edwards, D.V., Arms Control in International Politics, Holt, Rinehart and Winston Inc., New York et al, 1989.

Eisenhower, D.D., Mandate for Change, Doubleday, Garden City, 1963.

Epstein, W., The Last Chance: Nuclear Proliferation and Arms Control, The Free Press, New York, 1976.

Europa-Archiv, Graphischer Betrieb Kurt Weber, Bremen.

Evangelista, M., Innovation and the Arms Race: How the United States and the Soviet Union Develop New Military Technologies, Cornell University Press, Ithaca and London, 1988.

Florman, S.C., Blaming Technology: The Irrational Search for Scapegoats, St. Martin's Press, New York, 1981.

Forbes, Forbes Inc., New York.

Freud, S., Civilization and Its Discontents, Joan Riviere (trans.), Hogarth Press, London, 1969.

Garthoff, R., Soviet Military Doctrine, The Free Press, Glencoe, 1953.

George, A.L., Farley, P.J., and Dallin, A., U.S.-Soviet Security Cooperation: Achievements, Failures, Lessons, Oxford University Press, Oxford et al, 1988.

George, A., and Smoke, R., Deterrence in American Foreign Policy: Theory and Practice, Columbia University Press, New York, 1974.

Gilpin, R., War and Change in World Politics, Cambridge University Press, New York, 1981.

Globe and Mail, Thompson Newspaper Co. Ltd., Toronto.

Goldblat, J., Agreements for Arms Control: A Critical Survey, Taylor and Francis, London, 1982.

Haglund, D., and Hawes, M.K., World Politics: Power, Interdependence, and Dependence, MacMillan Press of Canada, Toronto, 1990.

International Journal, Canadian Institute for International Affairs, Toronto.

International Organization, MIT Press, Cambridge.

International Relations, Journal of the D. Davies Memorial Institute of International Studies, London.

International Security, MIT Press, Cambridge.

Jacobsen, C.G., Soviet Foreign Policy: New Dynamics, New Themes, MacMillan Press, Houndmills et al, 1989.

Jane's All The World's Aircraft 1971-72, Jane's Yearbooks, London, 1971.

Jane's Fighting Ships 1971-72, Jane's Publishing Co., London, 1971.

Jane's Weapons Systems 1979-80, Jane's Publishing Co., London, 1979.

Jervis, R., Lebow, R.N., Stein, J.G., Psychology and Deterrence, The John Hopkins University Press, Baltimore et al, 1985.

Journal of Conflict Resolution, Sage Publications, Beverly Hills et al.

Journal of Peace Research, World Friends Research Center, Philadelphia.

Journal of Social Issues, Plenum Publishing, New York.

Keohane, R.O., and Nye, J., Transnational Relations and World Politics, Harvard University Press, Cambridge, 1972.

Kolodziej, E.A., and Morgan, P.M., Security and Arms Control: Vol. 1: A Guide to National Policy-Making, Greenwood Press, New York et al, 1989.

Labrie, R. P., SALT Handbook: Key Documents and Issues 1972-79, American Enterprise Institute for Public Policy Research, Washington.

Laird, R.F., and Hoffman, E., Soviet Foreign Policy in a Changing World, Aldine Publishing Co., New York, 1980.

Lebow, R.N., and Stein, J., "When Does Deterrence Succeed and How do We Know?", Occasional Paper 8, Canadian Institute for International Peace and Security, Ottawa, 1990.

Lynn-Jones, S. M., Miller, S. E., and Van Evera, S., (eds.), Soviet Military Policy, MIT Press, Cambridge, 1989.

Maxwell, S., "Rationality in Deterrence", Adelphi Paper 50, International Institute for Strategic Studies, London, 1968.

MccGwire, M., Military Objectives in Soviet Foreign Policy, The Brookings Institution, Washington, 1987.

Military Balance. The, International Institute for Strategic Studies, London.

Nathan, J.A., and Oliver, J.K., United States Foreign Policy and World Order, Scott, Foresman and Co., Glenview, 1989.

NATO Review, NATO Office of Information and Press, Brussels.

New York Times, New York Times Inc., New York.

Nitze, P. Dougherty, J.E., and Kane, F.X., The Fateful Ends and Shades of SALT: Past ... Present ... and Yet to Come?, Crane Russak and Co., New York, 1979.

Nye, J., Allison, G., and Carnesale, A., (eds.), Fateful Visions, Ballinger Publishing Co., Cambridge, 1988.

Osteuropa, Druckerei Georg Appel, Wemding.

Ottawa Citizen, Southam Inc., Ottawa.

Pegis, A.C., (ed.), Basic Writings of St. Thomas Aquinas, Random House, New York, 1945.

Pfaltzgraff, R.L., Jr., and Kintner, W.R., (eds.), SALT: Implications for Arms Control in the 1970s, University of Pittsburgh Press, Pittsburgh, 1973.

Policy Review, The Heritage Foundation,
Washington, Vol.6, Fall 1978.

Public Administration Review, Journal of the
American Society for Public Administration, Chicago.

Public Papers of the Presidents, United States
Government Printing Office, Washington.

Quester, G.H., The Future of Nuclear Deterrence, Lexington
Books, Lexington et al, 1986.

Rapoport, A., The Origins of Violence: Approaches to the
Study of Conflict, Paragon House, New York, 1989.

Report of a Conference on Permissive Action Links,
Harvard Center of Science and International Affairs,
Cambridge, 1986.

Richardson, L.F., Statistics of Deadly Quarrels, Quadrangle
Books, Chicago, 1960.

Rosecrance, R., The Rise of the Trading State, Basic Book
Inc., New York, 1986.

Rosecrance, R., "Deterrence and Vulnerability in the Pre-
Nuclear Era", Adelphi Paper 160, International Institute of
Strategic Studies, London, 1980.

Saunders, A.N., (trans.), Greek Political Oratory, Penguin
Books, Middlesex, 1970.

Scheer, R., With Enough Shovels: Reagan, Bush and Nuclear
War, Vintage Books, New York, 1983.

Schelling, T.C., Micromotives and Macrobehaviour, W.W.
Norton & Co., New York, 1978.

Schelling, T.C., The Strategy of Conflict, Oxford University
Press, London, 1966, p.6.

Schelling, T.C., and Halperin, M., Strategy and Arms
Control, The Twentieth Century Fund, New York, 1961.

Seiler, G., Strategic Nuclear Force Requirements and Issues,
Air University Press, Maxwell Air Force base, 1983.

Singall, L.D., (ed.), Collected Papers: Vol.4, Associated
University Press, Boulder, 1974.

Smith, G., Doubletalk: The Story of SALT I, Doubleday and
Co., Garden City, 1980.

Sokolovsky, V.D., Military Strategy: Soviet Doctrine and Concepts, R. Garthoff (ed. and Trans.), Praeger Publishers, New York, 1963.

Soviet Military Power 1989: Prospects for Change, United States Department of Defense, Washington, 1989.

Soviet Noncompliance, United States Arms Control and Disarmament Agency, 1986.

Strategic Review, US Strategic Institute, Boston.

Survival, International Institute for Strategic Studies, London.

Talbott, S., Deadly Gambits, Vintage Books, New York, 1985.

Talbott, S., Endgame: The Inside Story of SALT II, Harper Torchbooks, New York, 1979.

Thompson, E.P., Exterminism and the Cold War, New Left Review, Verso, London, 1982.

Time, Time Canada Ltd., Toronto.

Toronto Star, Torstar, Toronto.

Ulam, A., Expansion and Co-existence: The History of Soviet Foreign Policy 1917-67, Praeger Press, New York, 1968.

UN Disarmament Yearbook. The, United Nations, New York, 1980.

Washington Post, Washington Post Co., Washington.

Washington Quarterly, MIT Press, Washington.

Weber, S., Cooperation and Discord in U.S. - Soviet Arms Control, Princeton University Press, Princeton, 1991.

Winner, L., Autonomous Technology: Technics Out-of-Control as a Theme in Political Thought, MIT Press, Cambridge, 1977.

Wolfe, T.W., The SALT Experience, Ballinger Publishing Co., Cambridge, 1979.

Woodward, R.L., Jr., (ed.), Central America: Historical Perspectives on the Contemporary Crises, Greenwood Press, New York et al, 1988.

World Politics, Princeton University Press, Princeton.

World Today, The, Royal Institute for
International Affairs, London.

Wright, B., World Weapons Database: Vol.1 - Soviet Missiles,
Lexington Books, Lexington, 1986.

Yearbook of the United Nations, UN Office of
Public Information, New York, 1961.

Young, O.R., International Cooperation, Cornell University
Press, Ithaca et al, 1989.

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