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**THESIS**

**REFLEXIVE LAUNCH STRATEGIES**

by

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June 1980

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REFLEXIVE LAUNCH STRATEGIES

by

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Submitted in partial fulfillment of the  
requirements for the degree of

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## ABSTRACT

Given the impending vulnerability of U.S. ICBMs, this thesis assesses the viability of countervailing reflexive launch strategies. Although capabilities are discussed, this thesis is non-technical and unclassified. Arguments are based on logical analysis of capabilities within the context of political realities.

This thesis establishes the relative utility of reflexive launch strategies as part of the total strategic deterrent posture. Presentation of evidence (logical; historical; quantitative) supports a case for specific reflexive launch options. The central thesis is that regardless of technical capabilities (e.g., warning systems or <sup>C<sub>3</sub> (Command, Control, and Communications)</sup> reflexive strategies are not substantial enough to act as a doctrinal shield for inherently vulnerable land-based forces. Alternatively, it will be shown that within the context of existing/projected U.S. weapon systems (e.g., MX, ALCM), as well as Soviet forces and perceptions, the capability for rapid retaliation prior to impact or immediately following an attack will remain an essential element of a credible deterrent. It is argued that survivable weapons simply shift vulnerability to the centers of political and economic power and do not obviate the requirement for deterring reflexive launch options.

TABLE OF CONTENTS

I. OVERVIEW-----8

    A. REFLEXIVE LAUNCH STRATEGIES-----9

II. THE THREAT-----12

    A. SOVIET COUNTERFORCE CAPABILITY-----12

    B. THE POLITICAL UTILITY OF COUNTERFORCE  
        CAPABILITY-----12

    C. COUNTERFORCE UNCERTAINTIES-----14

    D. SIDE EFFECTS OF COUNTERFORCE ATTACKS-----17

III. DEFINITIONS-----21

    A. ATTACK MODES-----21

        1. Launch on Warning (LOW)-----21

        2. Launch Under Attack (LUA)-----22

        3. Launch Under Attack Assessment (LUAA)-----23

        4. Launch on Impact (LOI) or Launch Through  
            Attack (LTA)-----27

        5. Launch After Attack-----28

        6. Flush on Warning (FOW) Modes: Delayed  
            Arm Commit and Launch into Holding-----29

            a. Delayed Arm Commit-----30

            b. Launch into Holding-----31

            c. Launch (On Warning) Into Orbit (LIO)---32

            d. Cruise Ballistic Missile (CBM)-----33

    B. REFLEXIVE MODE COMPARISON-----33

IV. TECHNICAL ISSUES-----35

    A. OPERATIONAL REQUIREMENTS-----35

    B. COMMUNICATIONS --- -----39

    C. TECHNICAL ADVANCES-----41

        1. Accuracy-----43

        2. Potential for Secure Inflight Command  
            Arming for RLS ICBMs-----43

    D. ALTERNATIVES TO REFLEXIVE STRATEGIES-----46

        1. Survivably Based ICBM-----47

        2. SLBM and Bomber/ALCM Dyad-----47

        3. Advanced Sea-Based Alternatives-----53

        4. ABM Alternative-----57

V.	THE CURRENT ROLE OF REFLEXIVE STRATEGIES-----	59
	A. THE PARADOX OF "INTERIM SOLUTIONS"-----	63
VI.	ISSUES AND PROBLEMS-----	66
	A. TARGETING FOR RLS-----	66
	B. RLS FORCE COMPOSITION-----	71
	C. PIN-DOWN-----	73
	D. "FAIL-SAFE" CONSIDERATIONS-----	75
	E. THE POLITICAL PROBLEMS OF A "HAIR TRIGGER" DETERRENT-----	78
	1. Reaction Time and the Decison Process-----	78
	2. Soviet Perceptions-----	87
	3. U.S. and Allied Perceptions-----	92
	4. Crisis Stability-----	94
VII.	THE FUTURE OF RLS-----	95
VIII.	CONCLUSION-----	99
	FOOTNOTES-----	101
	SELECTED BIBLIOGRAPHY-----	110
	INITIAL DISTRIBUTION LIST-----	117

In later time periods, when we have many protected and dispersed ICBM's it may be possible to fire ICBM's on the basis of radar or other tactical warning, since under these circumstances the enemy must fire large numbers of missiles and thus possibly be forced to give certain evidence of his intentions. This is unlikely to be true in the immediate future. For this and other reasons the early ICBM's cannot now rely solely on quick reaction for their protection. This does not mean that we do not wish to have a capability to react rapidly.<sup>1</sup>

Herman Kahn  
1960

## I. OVERVIEW

Given the impending vulnerability of U.S. ICBMs, this thesis assesses the viability of countervailing reflexive launch strategies. Although capabilities are discussed, this thesis is non-technical and unclassified. Arguments are based on logical analysis of capabilities within the context of political realities.

This thesis establishes the relative utility of reflexive launch strategies as part of the total strategic deterrent posture. Presentation of evidence (logical; historical; quantitative) supports a case for specific reflexive launch options. The central thesis is that regardless of technical capabilities (e.g., warning systems or C<sup>3</sup>) reflexive strategies are not substantial enough to act as a doctrinal shield for inherently vulnerable land-based forces. Alternatively, it will be shown that within the context of existing/projected U.S. weapon systems (e.g., MX, ALCM, as well as Soviet forces and perceptions, the capability for rapid retaliation prior to impact or immediately following an attack will remain an essential element of a credible deterrent. It is argued that survivable weapons simply shift vulnerability to the centers of political and economic power and do not obviate the requirement for deterring reflexive launch options.

## A. REFLEXIVE LAUNCH STRATEGIES

The evolution of strategic weapon systems capabilities and vulnerabilities, within a symbiotic context of political relationships, has periodically necessitated development of quick reaction launch strategies. Reflexive launch strategies as discussed in this paper cover a spectrum of rapid response ICBM launch options ranging from a retaliatory response in reaction to initial warning, to a strategic force launch--as the "dust settles"--following an initial Soviet nuclear attack. The use of the word reflex as an analogue to describe these strategies is appropriate in several ways:

- The response is required for defense.
- The response is predetermined.
- Reaction time available requires bypassing the routine decision process/network.
- The ability to bypass the full decision process does not preclude inhibition of the response mechanism, or intercession during the response process.

All of these reflexive launch concepts share the following key characteristics:

- Dependence on a highly reliable warning network:
- A commitment to rely on unilateral information sources and decision processes: Due to time constraints the decision to launch would be made without consultation with allies or the Soviets. However, it is possible that corroborative information could be received from allied forces (e.g., direct attacks or mobilization of Warsaw Pact forces).
- Acceptance of (worst case) warning-to-launch-commitment times of from 15 to 30 minutes.

- Acceptance of a devolution of launch authority, if required, as a result of loss of the President or communication between the forces and the NCA.<sup>2</sup>
- Preplanned, rapidly reprogrammable, flexible response options: The idea that the decision maker selects from a previously developed "menu" of defensive/re-taliatory attack packages. This preplanned response not only meets the demands of a small (i.e., less than 40 minutes) launch window, but also recognizes that even with survivable forces, major elements of the decision making and supportive information systems may be destroyed.

The above listed essential features of RLSs form the basis for the major argument against these strategies. That the response is made without careful consideration of enemy and friendly force status, political consultation with allies or post-attack development of a coordinated response plan.

As F. P. Hoerber states,

The question, "Launch against what?", is non-trivial: Against cities, and insure disaster? against Soviet silos, presumably partially empty? against some perhaps mixed, target set that may not turn out--after we had largely disarmed ourselves--to be an effective set? In short, do we want to escalate without thinking or negotiating?<sup>3</sup>

Hoerber's questions are interesting; however, they leave unstated a distinct set of questions regarding the alternative: If we delay launch, will we have the information or the level of competence required to make a "better" decision? Would delay permit uninhibited, irreversible Soviet attack momentum (e.g., conventional invasion of Western Europe)? Would a policy of "wait and negotiate" lead to a "rational" decision of negotiated (i.e., western block vital compromise)

settlement with no retaliation? Does such a logic progression ultimately render the U.S. nuclear deterrent incredible?

## II. THE THREAT

### A. SOVIET COUNTERFORCE CAPABILITY

The essential nature of war as a continuation of politics does not change with the technology of armament. When atomic and hydrogen weapons are employed surprise is one of the decisive conditions for the attainment of success not only in battles and operations but also in war as a whole.

We cannot ignore the lessons of history and we must always be ready for pre-emptive actions against the perfidy of the aggressors.<sup>4</sup>

Marshal P.A. Rotmistrov  
1955

We do have a problem with regard to the survivability of the Minuteman force, and the options are more limited than they were before; but that is the price that we have chosen to pay in order to put an upper limit on the total raw strategic power in the Soviet ICBMs.<sup>5</sup>

Dr. John S. Foster DDR&E  
1972

Beginning with the "bomber gap" of the 50's, Soviet counterforce potential has been an important issue. The advent of MIRV technology provided the additional element numerical advantage to the attacker. Soviet hardware, such as the SS-18, and Soviet pronouncements have consistently indicated a Russian drive to develop credible counterforce capability. As Soviet Col V. Larionov states:

The white-hot culminating point will move to the beginning period of the war---the surprise mass use of nuclear rocket weapons can bring utter defeat to an enemy in the shortest time.<sup>6</sup>

Although this paper accepts Soviet counterforce potential as a "given",<sup>7</sup> three counterforce issues are relevant to discussion of the role of reflexive strategies:

- The military and political (perceptual) value of counterforce capability.
- The uncertainties regarding real-world counterforce employment.
- The "side effects" of a counterforce attack.

#### B. THE POLITICAL UTILITY OF COUNTERFORCE CAPABILITY

Since both we and the Soviet Union are investing so much of our capability for flexible and controlled responses in our ICBM forces, these forces could become tempting targets, assuming that one or both sides acquire much more substantial hard-target kill capabilities than they currently possess. If one side could remove the other's capability for flexible and controlled responses, he might find ways of exercising coercion and extracting concessions without triggering the final holocaust.<sup>8</sup>

James Schlesinger  
1975

For the Soviets, the coercive value of counterforce capability is not united in its employment,\* but rather in

---

\*There are three principal types of counterforce attack:

- An attack designed for damage limiting preceding a central nuclear war.
- An attack structured to reduce U.S. limited nuclear option (LNO) forces.
- An attack designed to achieve coercive advantage by significantly altering the strategic balance. See Congressional Budget Office, Counterforce Issues for the U.S. Strategic Nuclear Forces (Washington: U.S. GPO January 1978), p. 5.

its political worth; Soviet compelling power is significantly enhanced as a result of their counterforce potential. Analysts such as Herman Kahn believe that although a substantial proportion of the U.S. retaliatory forces would survive a coordinated counterforce attack, it might be possible for the Soviets to deter a U.S. counterattack. The logic of his analysis is based on the mathematics associated with the remaining series counterattacks. As Kahn asserts:

...In this attack,\* the attacker would try to destroy a significant portion of the defender's first-strike forces and even some of his second-strike forces, but would avoid as much as possible, civilian targets. This would make it disadvantageous to the defender to launch a counterstrike since the defender's damaged forces might be able to do only a limited amount of damage even with a countervalue strike, while the attacker might be able to deliver an annihilating blow in reprisal with his withheld and regrouped forces. The defender is also under pressure to negotiate since it is now probable that the attacker could threaten another attack, this one an all-out strike against the rest of the second- and first-strike forces.<sup>9</sup>

#### C. COUNTERFORCE UNCERTAINTIES

The basic problems in any discussion of attacks against ICBMs is the wide range of uncertainties in the calculation of success probability. At the lowest level, for example, is the fact that no one has ever fully tested\*\* an ICBM. There is no operational (or even R&D experience) with the

---

\*Kahn calls this a "constrained disarming attack."

\*\*ICBMs have been fired and warheads have been detonated, but an ICBM with a live warhead has never been test fired. Additionally the effects of a polar trajectory are not fully tested.

coordination and launching of several hundred ICBMs, and the immediate and long term nuclear effects of rapid explosion of over 2000 high yield warheads is not fully understood. These uncertainties were emphasized during the March 1974 Senate Foreign Relations Committee Hearings:

Secretary Schlesinger...As you know, we have acquired from the western test range a fairly precise accuracy, but in the real world we would have to fly from operational bases to targets in the Soviet Union. The parameters of the flight from the western test range are not really very helpful in determining those accuracies to the Soviet Union. We can never know what degrees of accuracy would be achieved in the real world.

Senator Symington...People get the idea perhaps you would only kill a hundred people, when actually a tiny shift would make all the difference. I do not suppose anything has been more carefully engineered in world history than the astronaut programs--

Secretary Schlesinger. Yes.

Senator Symington (continuing). And yet, in fact, they have had many troubles many times; and just a tiny production error would destroy Kansas City when an enemy was going after Whiteman, you see. Great in theory, but in practice, I cannot follow the thought.<sup>10</sup>

Finally, the key issue of fratricide and the associated critical problems of timing and reprogramming\* create considerable question as to the operational feasibility of a counterforce attack.<sup>11</sup>

These unknowns as well as those in Figure 1 result in a balancing element of deterrence to the possessor of

---

\*To replace launch of boost failures.

Figure 1

UNCERTAINTIES AFFECTING DYNAMIC MEASURES  
OF STRATEGIC CAPABILITIES

1. Uncertain Weapons Parameters

--Yield	--Launch rate
--Accuracy	--Reprogramming
--Reliability	--Retargeting time
--Systematic bias error	--Support system performance
--Availability	--Warhead loadings
--Range	--Height of burst on airbursts

2. Uncertain Force Employment Parameters

--Prelaunch survivability	--Command-control connectivity
--Penetration probability	--Reconnaissance
--Fusing/burst height	--Fratricide

3. Uncertain Scenario Conditions

--Warning	--Attack timing
--Alert level	--Attack objectives
--Scale of attack	--Employment of reflexive strategies

4. Uncertain Target Parameters

--Hardness/shielding	--Mobility
--Size and shape	--Value
--Location	--Climate conditions

5. Uncertainties Due to Modelling Deficiencies

--Prompt effects	--Radiation level
--Fallout effects	--Fratricide

Source:  
1978 Proceedings of the National  
Security Affairs Conference  
(Washington: National Defense  
University), p. 34 and Author's  
Assessment

counterforce potential. As Soviet Lieutenant Colonel

V. M. Bonduremko noted:

The combat possibilities of nuclear rocket weapons which have been studied only under limited conditions of the testing range, in the opinion of many specialists are really not known to this day and this causes difficulties in determining the organizational form of army structure.\*<sup>12</sup>

#### D. SIDE EFFECTS OF COUNTERFORCE ATTACKS

Unfortunately, many dispassionate, analytical discussions of postulated Soviet counterforce attacks attempt to project an image of ICBM counterforce as a surgical disarming attack. A cursory review of the map of U.S. counterforce targets provides a different image. Not only are key U.S. targets located near population centers, but they also virtually cover the entire country. The argument is not against the military value of counterforce weapons, but rather against an unrealistic vision of the results of such an attack. As Barry Carter states:

Finally, some U.S. retaliation would seem very likely to the Russian leadership since tens of millions of Americans would be killed in any "Minuteman only" attack. In attacks against silos the bombs are set to explode as close to the ground as possible, thereby picking up much dirt and debris. The fallout from the explosion of thousands of megatons\* of nuclear weapons over the Minuteman fields would be tremendous, and winds would carry lethal contamination over many major U.S. cities. Such calculations of fallout do not even include the possibility of a few Russian warheads going off source and directly hitting populated areas, not the collateral damage by Russian attacks against other targets, such as bomber bases, many of which are near cities.<sup>13</sup>

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\*Emphasis added.



Herman Kahn drew a similar conclusion:

...neither side might want to hit many, or any large cities early in the war....However, if there are a number of missiles fired at strategic bases it is more than likely that some will go astray; these could easily strike heavily and disastrously populated areas.<sup>14</sup>

Sidney Drell and Frank von Hippel quantified these "side effects" of a Soviet counterforce attack:

The Defense Department's response of July 1975 presented new casualty figures...A heavier strike with two three-megaton warheads, one a surface burst and the other an airburst, directed at each silo would cause 18.3 million fatalities...A "comprehensive" attack with two one-megaton surface bursts on each ICBM silo and strikes against the 46 Strategic Air Command (SAC) bases and the two bases for ballistic-missile submarines, would cause 16.3 million fatalities....<sup>15</sup>

The problem of analyzing the potential vulnerability of U.S. land-based ICBMs is a formidable one. It is a complex interacting mixture of force potential, technical uncertainties and most significantly, political goals and perceptions. John Steinbruner and Thomas M. Garwin summarized the problem as follows:

...the beginning of wisdom on this issue is to be found in realization of the inevitability of ignorance and in acceptance of its consequences; that on the basis of technical information available--at whatever level of privileged access--calculations of vulnerability are indeterminate; that categorical assertions about vulnerability, which are frequently found in current political discourse, rest upon tacit assumptions more than technical fact; and, that the usual assumptions are not the only ones which ought to be made. More succinctly stated, vulnerability of the land-based missile forces, to paraphrase Wolfgang Panofsky, is far more a state of mind than a physical conditions, but, nevertheless,

it is an extremely important state of mind, worthy  
of the most exacting analysis.\*16

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\*Emphasis added.

### III. DEFINITIONS

#### A. ATTACK MODES

##### 1. Launch on Warning (LOW)

Most treatments of the subject of reflexive launch strategies center on launch on warning (LOW). This focus on LOW is based on its historical relevance as the original conceptualization of a reactive launch strategy, and the fact that all other such strategies are essentially derivatives of LOW. The problem with LOW is that it is an imprecise, ambiguous term (i.e., what constitutes warning and what is the character of the response?). The problem, however, goes well beyond "squishy" semantics: the critical ambiguity is in the warning, not the words.

LOW is defined as "a launch in response to sensor indication of an attack on the continental United States (CONUS)"<sup>17</sup> and is essentially an extension of a traditional policy of launching strategic bomber forces on receipt of attack warning. The obvious difference is that while bombers are recallable, current U.S. strategic missiles are not. Irrevocability is a feature of all existing ICBM launch strategies, but it is most significant in the LOW scenarios. Although the definition of "warning" may be modified by political and technical factors, LOW is hierarchically a

a decision made with the minimum acceptable level of information; it is coincidentally a decision of potentially apocalyptic proportion. What makes LOW problematical is not only the myriad of associated technical issues, but also this "gut level" paradox of making a decision of the greatest import with the lowest (hierarchical) level of information (and ergo, confidence). In its simplest form, LOW could be considered a preemptive attack (e.g., "warning" being a small launch or even an aggressive force reposturing within the context of a crisis level political scenario) or an unintentional and premature escalation.

## 2. Launch Under Attack (LUA)

LUA is similar to the previously described LOW, but differs in two major respects. First, attack is defined as a massive assault on value and/or force. Second, the criterion for attack existence is a multiphenomenological (i.e., sensors, scenarios, intelligence) unambiguous correlation of information. The key to the LUA concept is the existence of several independent but corroborative indicators of a massive attack in progress. For example, the U.S. currently has four major systems for detecting strategic attack: early warning satellites; the Ballistic Missile Early Warning (BMEWS) network; PAVE PAWS (SLBM warning radar); and the Safeguard-developed Perimeter Acquisition Radar (PAR) at Grand Forks, North Dakota.<sup>18</sup> The idea is that sequential

and mutually substantiating attack reports will come from these four independent warning systems.

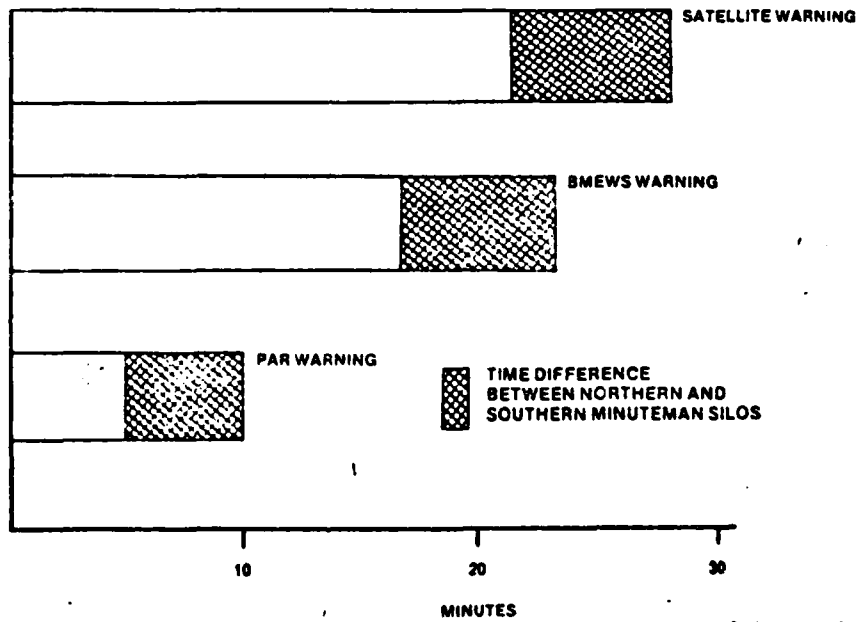
Additionally, the origin, size, and general target area can be pieced together from these progress reports:

Thus, if a large attack were made against our land-based missiles, the satellite detection system would count the attack, provide its approximate target area, and determine when the attacking missiles would be seen by BMEWS radars in Alaska and Greenland. Approximately ten minutes later these radars would observe the missile re-entry vehicles (at the time that the satellite system forecasted), verify the size of the attack and its likely targets, and predict when the PAR radar in North Dakota would see the attack. Finally, again at the expected time, the PAR radars would verify information previously provided by the other sensors and determine precisely what targets were being attacked.<sup>19</sup>

### 3. Launch Under Attack Assessment (LUAA)

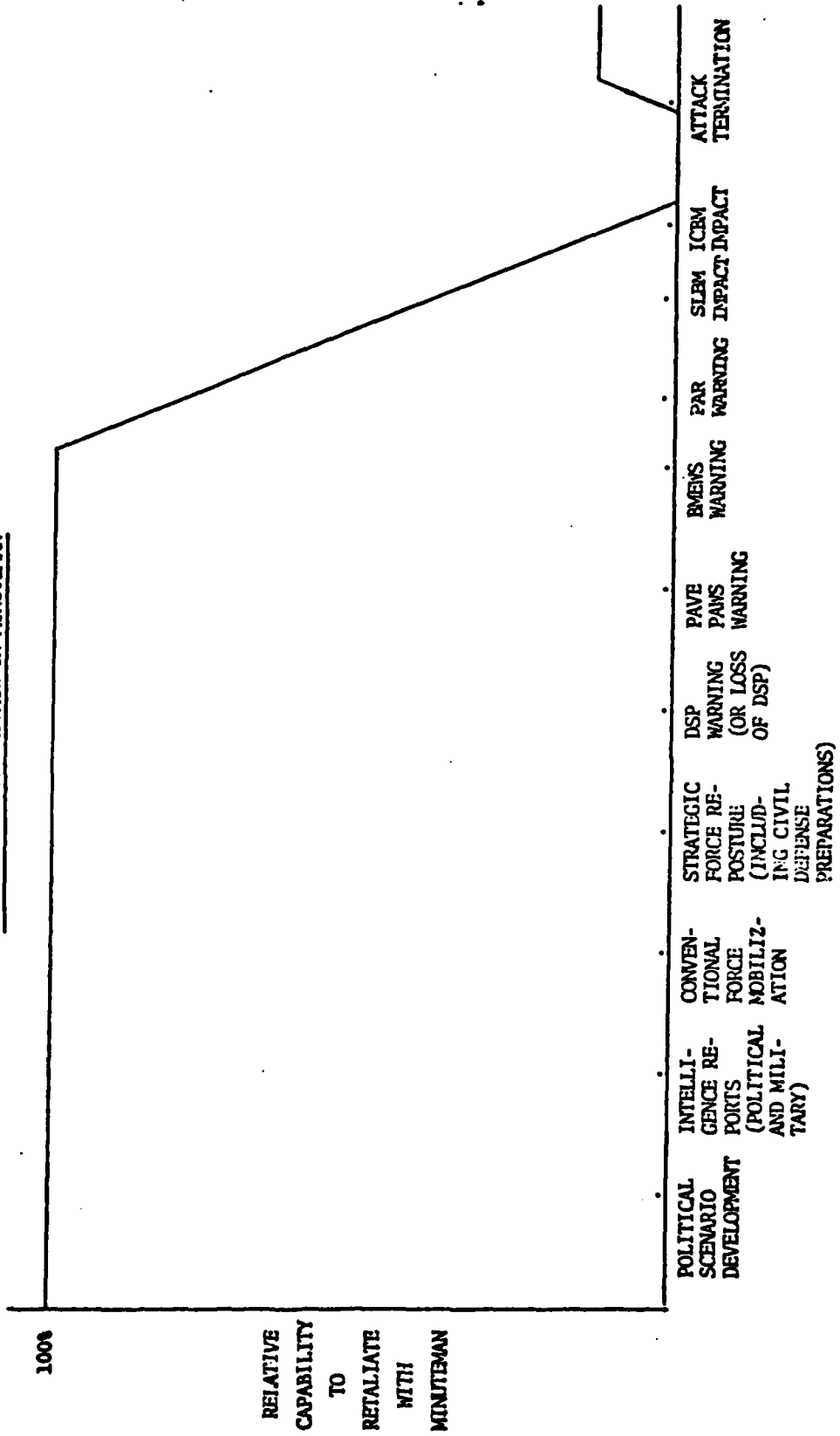
This mode is virtually identical to the above described LUA. LUAA is in fact a politically motivated redefinition of LUA. The implication of LUAA is two-fold. First, it implies considered analysis of the existence of an attack (and implicitly the choice of response) and, secondly, it includes the ability to carefully define attack size, target(s) and origin. SAC Commander Gen. Richard Ellis, however, has serious reservations about the time and technical capability available to make LUAA (as opposed to LUA) a reality. According to General Ellis, "time is equally crucial for attack assessment of incoming ICBM's and SLBM's. Yet the existing system will

Figure 3  
STRATEGIC WARNING SEQUENCE



Source: A. Hall, "The Case for an Improved ICBM," Astronautics and Aeronautics, February 1971.

Figure 4  
CHRONOLOGIC INDICATIONS  
OF A COORDINATED ATTACK ON MINUTEMAN



not accurately assess an ICBM/SLBM attack under all conditions because the time is inadequate." <sup>20</sup>

Proponents of LUAA attempt to project an image of "lightning fast" computer analysis of multiple inputs coupled to an instantly reprogrammable highly responsive attack force controlled by an inhibiting Presidential (NCA) permissive action link (PAL). The argument becomes significantly more compelling if the "bolt out of the blue" surprise attack is discounted. The effectiveness and credibility of any military response cannot be separated from the total political-military situation.

The argument is that "rational" strategic attacks would have telegraphed precursors far in excess of infra-red signatures and radar blips. Those who postulate a real possibility of a Soviet strategic attack must see its reality coupled not only to war aims, but also to extensive (visible) military and civil defense mobilization. What emerges is essentially a paradox of time. Those who build a case for Soviet strategy based on counterforce, warfighting and damage limiting, state with equal assurance that reflexive launch strategies are not feasible due to the paucity of response time (10 minutes for SLBM attack; 20 minutes for ICBM attack). What they fail to explain is how the Soviet Union can disperse its people, shelter key cadres, batten down critical industries, destroy western satellites and intelligence sources, mobilize troops on the western and southern flanks and scramble air defenses

all within less than one hour and all without alerting the United States.

Essentially, current technical limitations and ultimately finite human limits make a literally defined launch-under-assessment (emphasis on assessment) in response to an irrational surprise (to both sides) attack improbable. This type of attack favors analysis such as William Schneider's:

The 'launch on assessment' concept is obviously fraught with uncertainties and risk--particularly the risk of accidental conflict--and there is little indication that it is considered seriously within the U.S. Administration. Nevertheless, it does represent one conceivable answer to the problem of Minuteman vulnerability--albeit a dangerous answer.<sup>21</sup>

However, for other scenarios, encompassing deteriorating political relations and/or escalating military attacks/preparations, the LUAA concept becomes technically more feasible and politically more credible.

4. Launch on Impact (LOI) or Launch Through Attack (LTA)

LOI assumes that reflexive launch would not take place until actual nuclear detonation(s) occur in or above the target area. On the surface LOI appears to be the most attractive reflexive strategy due to its greater uncertainty that missiles are only fired in response to a "real" attack; but LOI (sometimes known as Launch Through Attack) entails severe conceptual and technical problems. Although it takes about twenty minutes to attack a Minuteman field due to fratricide effects, the same effect acts to limit launch during or through an

attack. (ICBM's would be vulnerable to blast and radiation during boost phase)<sup>22</sup> The distance between northern and southern Minuteman silos equates to an approximate 5 minute warning advantage for the southern targets.<sup>23</sup> However, a strategy depending on impact for assurance could easily be negated by the use of simultaneous arrival times (on northern and southern fields) instead of a simultaneous launch of the initial attacking forces. This tactic augmented by use of SLBM's for pin down\* and/or attacks on the National Command Authority (NCA) could thwart a true LOI or Launch Through Attack strategy. In fact when viewed within the range of strategies LOI is the most demanding reflexive response since it required information (e.g., sensor detection<sup>24</sup> or human report of detonation) and commitment (to launch) in the most demanding trans-attack period. LOW and LUA permit attack with the full C<sup>3</sup>I and retaliatory force intact; Launch-After-Attack (LAA) allows for some assessment of the force status and the nature of the total attack; LOI conversely provides neither the pre-attack C<sup>3</sup>I force integrity of LOW/LUA nor the considered situation assessment of LAA.

##### 5. Launch After Attack

As defined here, Launch after Attack (LAA) is a reflexive response that could be employed in two cases. The first would be an immediate launch of all ICBM's remaining after a partially successful first wave counterforce attack. The second would be an immediate reflexive launch in response

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\*See page 73.

to an attack on government, economic or military targets. This second case is predicated on having survivable forces (e.g., MX), but vulnerable centers of political, economic and military power. The concept in this scenario is not a launch to protect strategic forces (or a deterrent threat of such a response to counterforce attack), but rather a sure (virtually automatic) and immediate retaliation that is not dependent on survival of the NCA or even the entire Washington Politico-Military establishment. LAA differs from other reflexive launch strategies in that, unlike the others that play both deterrent and defensive roles (protection of the missiles), LAA is principally a deterrent posture. It removes any doubt (however limited) that a successful massive attack on U.S. centers of government, military and economic power would so cripple the country that a retaliatory attack might appear counter-productive.

6. Flush on Warning (FOW) Modes: Delayed Arm Commit and Launch into Holding

Flush on Warning reflexive strategies differ from the above described attack modes in two primary aspects:

- FOW ICBMs are not committed to destroying enemy targets at launch.
- Because FOW forces are not committed, they can be launched earlier and with less information about the nature and origin of the attack.

Two general FOW concepts have been suggested, neither of which has been developed or deployed. These FOW categories are Delayed Arm Commit and Launch Into Holding.

a. Delayed Arm Commit

This concept, as described by Richard L. Garwin, involves employment of a secure, jam-resistant command link to arm or disarm a missile in flight. Garwin urges a further hedge by launching no more than 50 percent of the force. Two primary advantages derive from a system with an inflight arm command capability:

- A time advantage of approximately 15 additional minutes to commit to target destruction. This time advantage is, however, more than just 15 minutes of assessment and decision process time: these 15 minutes roughly equate to the flight time of an SLBM pin down of C<sup>3</sup> attack. Additionally, these 15 minutes allow for the occurrence of unambiguous nuclear detonation (in the Minuteman fields or elsewhere) prior to an irrevocable U.S. commitment to nuclear attack. In other words, this system allows the advantages of both Launch on Warning (fast reaction) and the other extreme of Launch on Impact (greatest certainty).
- The inclusion of an additional safety link in the attack system (the command arm link). This safety link provides an important spin-off by permitting development of a more highly responsive attack assessment NCA launch system.

This system, when tied to an operational policy of launching only a fraction of the force, would also eliminate the problem of an accidental launch that is subsequently not armed but effectively disarms the U.S. by emptying all the Minuteman and Titan silos.

The delayed arm commit system, though neat theoretically, is fraught with serious pragmatic problems. Regardless of the myriad arguments concerning time factors,

deterrence, targeting, etc., the key fallacy in the logic of this approach is the requirement for a 100 percent reliable arm/disarm command link to the missiles.

If the arm inflight mode is chosen, then there is the possibility of system failure or military vulnerability.<sup>25</sup> The alternative of the option to disarm in flight is even more problematic; for if it is needed to redress an inadvertent launch, then it must be failsafe (i.e., all missiles must respond to the disarm signal). As has been shown by nuclear power plants and other exhibits of state-of-the-art technology, "fail safe" systems are politically public perceptions), if not technically, impossible to construct.

b. Launch into Holding

Launch into holding systems differ from the above Delayed Arm Commit concepts in two ways:

- The decision time is significantly expanded allowing earlier launch (by lower echelon authority) and protracted attack assessment and force commitment time.
- The weapons may be totally or partially recovered and in some systems, reused (after refurbishment) in the event of an inadvertent or excessive force launch.

Two such systems have been recently proposed for technical analysis and possible deployment to supplement the MX system,<sup>26</sup> launch (on warning)-into-orbit and the cruise-ballistic-missile.

c. Launch (On Warning) Into Orbit (LIO)

This system involves modification of Minuteman II or III to provide increased boost thrust, a variable thrust, restartable upper stage, enhanced navigation system and a secure jam-proof communications link. Under this concept, on initial Defense Support Satellite warning, a portion of the force would be launched into parking orbits to await release by the NCA or a recall order. Orbital mechanics and velocity correction could allow for inflight target selection or reprogramming. Key to this system is a network of ground stations used for communications and guidance update to the missiles.<sup>27</sup>

It is this reliance on ground communication and the added complexity that, in addition to political problems, are the main deficiencies of the system. Among the principal advantages of standard ICBMs are autonomy after launch and relative simplicity of operation. Autonomy eliminates the need for vulnerable ground links while simplicity of operation enhances reliability. Under optimum conditions, maintaining coordinated control of one hundred or more orbiting missiles would be a formidable task; performing this task during/after a massive Soviet attack becomes questionable. Additionally, these warheads would be vulnerable to anti-satellite attack (ASAT). Spin-off advantages of LIO include:

d. Cruise Ballistic Missile (CBM)

The concept involves a hybrid vehicle consisting of a huge (90 foot wingspan) cruise missile tied to a Minuteman III ICBM. On warning, this combined vehicle would be cold-launched, boosted to about 20,000 feet and then loiter in the aerodynamic cruise mode awaiting orders from the NCA. The vehicle could remain aloft for extended periods, land to be refueled or on command launch its Minuteman III.<sup>28</sup> This system faces the same technical drawbacks as the Launch Into Orbit system but has the added hazard of live warheads cruising over the United States in unmanned vehicles. It can be argued that in a nuclear war political problems of unmanned nuclear vehicles are not a consideration and that the risk of crash and/or compromise are acceptable in an actual war. However, an unresolved paradox is present in this logic: If the risk is acceptable because the system is only used in an actual nuclear war, then why is it needed at all? Why not just employ LUA/LUAA?

B. REFLEXIVE MODE COMPARISON

The preceding RLS definitions are significant to any examination of this issue. The convention in strategic literature to characterize all reflexive launch strategies as "Launch on Warning" is deceptive. It is easy to dismiss the employment of any reflexive option under any circumstance if all are characterized as automatic, instantaneous

and complete counter-value spasms released in response to a "bolt out of the blue" signal from a single early warning satellite. However, if the scenario is redefined, a different conclusion is apparent. If the reflexive response is a surgical, counter-military attack and is launched during a crisis (e.g., the beginning of a Warsaw Pact invasion of Western Europe) in response to sequential, corroborative warning indications culminating with precise PAR indication of counterforce targeting, then a Launch Under Attack becomes a credible choice.

#### IV. TECHNICAL ISSUES

Although this paper owing to classification and scope cannot present an indepth analysis of all technical issues pertinent to Reflexive Strategies, it is necessary to examine the principal technical elements that preclude or enhance the employment of reflexive postures. Two topic areas are of primary concern in assessing the impact of technical issues:

- Operational Requirements - Those things that are needed to construct a credible RLS system.
- Technical Advances that have changed assumptions regarding and requirements for RLS systems.

##### A. OPERATIONAL REQUIREMENTS

...timely and reliable warning and assessment of an attack is essential to our offensive forces. Such warning and assessment increase the survivability of our retaliatory and C<sup>3</sup> resources and add credibility to our statements that the Soviets cannot count on finding our increasingly vulnerable ICBM's still in their silos during any first-strike attempt.<sup>29</sup>

Harold Brown  
1980

To have a viable capability for reflexive commitment, Richard Garwin has stipulated that a force have the following elements:

- A sensor or set of sensors adequate to detect the launching of the potentially disarming attack and to assess its severity, and sufficiently reliable not to indicate such launch when it had not taken place.

- The communications means to connect the sensors to the decision-making authority for the United States, (the "NCA," or National Command Authority).
- Time to establish that a disarming strike had been launched by the other side.
- People, equipment, and procedures to use the communicated sensor information to authorize the launch of a portion of the U.S. ICBM force, against an appropriate target set and with some choice of warhead arming--irrevocable, command-arm or command-disarm.
- The communications means to carry this decision to the force to be launched.
- Sufficiently rapid fly-out of the launch-under-attack missiles, so that they are not caught in or near their silos after receipt of the order to launch.
- System components sufficiently robust so that the launch-under-attack capability cannot be denied the United States by the expenditure of resources very much less than those required to destroy the ICBM silos (unless those measures are unambiguous and themselves such as to cause launch of the ICBM force).<sup>30</sup>

Critics of the practicality of employing an RLS doctrine state, essentially, that each of the above listed requirements represents a potential weak link in the chain, that there are unresolved technical and "operational" (i.e., man in the loop) questions, and that there is too little time available to provide assurance that each of these requirements could be satisfied. The statement of William Graham and Paul Nitze exemplifies these technical reservations:

The survivability of our land-based missile force under a launch-on-warning concept would require that our early warning systems had not been neutralized, and would be totally dependent upon the high reliability of our warning systems to detect and comprehend an actual attack, whatever action the attacker chose to take. At the same

time, exceptionally reliable interpretation and rejection of erroneous information indicating that an attack was underway would be essential. Both of these requirements, as well as the problems of avoiding pin-down and of maintaining continuity and nearly instantaneous response in the chain of command in the face of a carefully coordinated attack, pose extremely formidable technological and other difficulties.<sup>31</sup>

A key question of technical capability is the vulnerability of the warning systems themselves.

Early-warning satellites (which contain infrared sensors, visible light detectors and particle and radiation sensors) might be blinded or attacked: Would such action be judged to be the equivalent of early warning or a missile attack? Simultaneously, one or more of the three Ballistic Missile Early Warning System (BMEWS) facilities could be destroyed....<sup>32</sup>

Colin Gray's statement is supported by Deputy Under Secretary of Defense Zeiberg's statement that "While we continue to maintain the capability to launch our ICBM force on warning of an attack we cannot rely on such an option since it lacks the stability required in a crisis and depends on warning systems which may themselves be vulnerable."<sup>33</sup> Gray's further analysis that an attack of the DSP satellites and one of the BMEWS radar would leave "...the United States with no\* reliable early warning capabilities vis-à-vis the principle missile threat window"<sup>34</sup> is, at the least, hyperbole. This frequent criticism of the viability of

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\*Emphasis added--this statement ignores the PAR system. While PAR does not provide the early warning margin of the DSP satellite, it does provide time-sufficient attack analysis. Early warning, however, would be provided by aggressive destruction of the DSP and/or the BMEWS: Explosive destruction of BMEWS provides a far less ambiguous indication of potential attack than blips on a radar scope.

substantial effort is being expended in diversifying, modernizing Reflexive Launch concepts ignores two major considerations. First, the U.S. Warning network consists of more than the Defense Support Satellites and BMEWS radars. Additionally, substantial effort is being expended in diversifying, modernizing, expanding and hardening the United States' strategic surveillance and warning system:

We have begun a number of efforts aimed at enhancing the survivability of our missile attack warning systems and improving the quality of attack assessment information supporting NCA response option selection (including maintaining the option of a Presidential decision to launch our missiles when they are under attack). We are planning both near-term and long-term improvements in the early warning satellite system, for early warning of ICBM and SLBM attacks. Evolutionary improvements to increase the survivability and capability of the satellite systems continue to be incorporated during the production cycle for replacement satellites.

Our ground-based radar systems would confirm satellite warning of ICBM or SLBM attacks. For the northern approaches, we depend on the Ballistic Missile Early Warning System (BMEWS) radars at sites in Greenland, Alaska, and England to confirm an ICBM attack. Programmed improvements of the Greenland BMEWS radars, which view the missile approaches to central CONUS, will produce better estimates of attack size and impact points that should be sufficient to verify an attack on our MINUTEMAN force. We also plan to complete the replacement of obsolete computers at all three BMEWS sites. The Perimeter Acquisition Radar Characterization System (PARCS), a converted ABM radar, will act as a backup for BMEWS coverage of ICBM attacks against central CONUS until the BMEWS improvements are completed. The PARCS is being upgraded to provide more timely and accurate impact point prediction for a larger number of RVs.

Ground-based surveillance radars along our coasts would confirm satellite warning of an SLBM attack. Two new PAVE PAWS phased-array radars will replace all but one of the FSS-7 SLBM warning radars. PAVE PAWS radars provide improved coverage along the east and west coasts. In addition to PAVE PAWS, we will continue to operate the older FPS-85 phased-array radar and one FSS-7 in Florida to cover possible SLBM launch areas southeast of the United States.<sup>35</sup>

The second major problem with RLS critiques that center on warning systems vulnerability is that these arguments are too narrow in focus. These discussions do not present a complete scenario including the state of the East/West political-military relationship. If a crisis developed and/or if we noted Soviet civil defense and military mobilization combined with aircraft dispersal and increased Soviet Naval SSBN and surface combatant deployment levels, and if all of this was followed by "mysterious" loss of one or more of our DSP satellites, then it is difficult to argue that we have "lost our early warning capabilities."

#### B. COMMUNICATIONS

Reservations regarding the ability to maintain communications between the NCA and the strategic forces equal those concerning warning system vulnerability. SAC Commander General Ellis has said: "Whether communications can be maintained through this trans-attack period is problematical. We know how to restore communications after the trans-attack period, but this takes time. Minuteman survivability depends upon communications: MX does not."<sup>36</sup>

**Figure 5**  
**RLS**  
**OPERATIONAL REQUIREMENTS**

RLS MODE	HIGH DEGREE OF CERTAINTY PRIOR TO COMMITMENT	LONG DECISION TIME <sup>1</sup>	LOW VULNERABILITY TO PIN DOWN	LOW DEMAND ON WARNING SYSTEM	LOW DEMAND ON C <sup>3</sup>	HIGH DETERRENT CREDIBILITY
LOW	1	1	3	1	1	1
LUA	2	2	2	2	2	2
LUAA	2	2	2	2	2	2
LOI	3	3	1	3	1	3
LAA <sup>2</sup>	4	4	4	4	2	4
DAC	3	2	3	1	1	2
LIO	4	3	3	1	1	3
CBM	4	4	3	1	1	3

Note : Numbers 1 through 4 indicate relative capability of fulfilling requirements:  
 1 indicates least capable  
 4 indicates most capable

- LOW - Launch-On-Warning
- LUA - Launch-Under-Attack
- LUAA - Launch-Under-Attack-Assessment
- LOI - Launch-On-Impact
- LAA - Launch-After-Attack
- DAC - Delayed Arm Commit
- LIO - Launch (On Warning)-into-Orbit
- CBM - Cruise Ballistic Missile

<sup>1</sup>Decision time prior to commitment to attack (not launch)

<sup>2</sup>LAA is defined as a launch of surviving forces (or survivable forces) immediately following an initial attack

Dr. Harold Brown supports this analysis:

Our deterrence strategy requires that strategic C<sup>3</sup> should be capable not only of supporting assured retaliation after an initial surprise attack, but also of managing our strategic reserve forces throughout a protracted nuclear war. The survivability, flexibility and endurance of these C<sup>3</sup> systems should be at least comparable to that of our strategic forces. They should be capable of operating in environments disrupted by electromagnetic, nuclear and chemical/biological effects. At present, our ability to meet these objectives falls considerably short.<sup>37</sup>

These current deficiencies have a much greater deleterious effect on post-attack retaliation or Launch Through Attack/ Launch on Impact policies than on Launch on Warning.

Additionally, there are no serious technical barriers to hardening the present C<sup>3</sup> system. As Dr. Brown states:

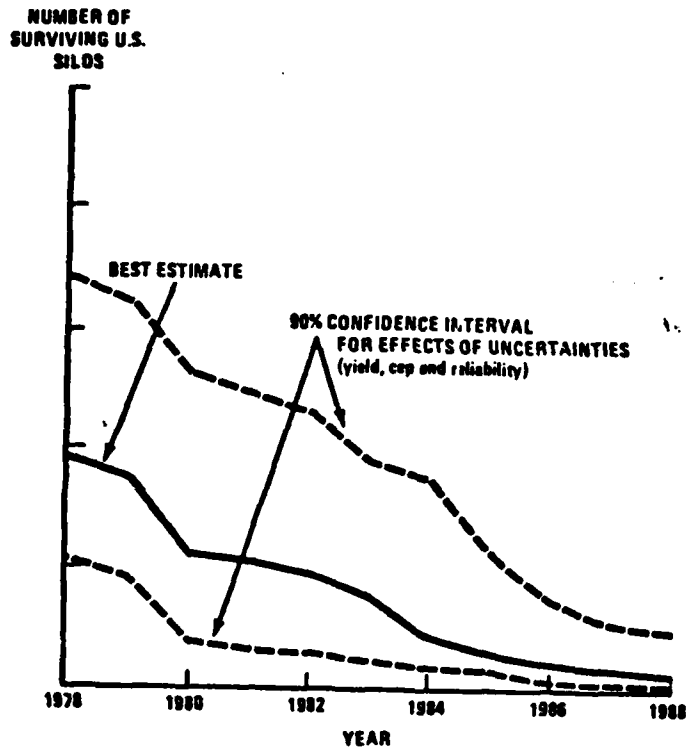
The land-based ICBM's are becoming increasingly vulnerable and tactical warning is as a consequence, increasingly important to the mission accomplishment of this leg of the TRIAD. Our programs will reduce the vulnerability of our strategic communications to physical attack, jamming and nuclear effects.<sup>38</sup>

#### C. TECHNICAL ADVANCES

"The flight testing by the Soviets in 1977 of an improved post-boost guidance and control system for the SS-18 MOD 4 suggests that the Soviets are capable of deploying ICBM-based re-entry vehicles with a yield and accuracy combination sufficient to destroy the hardest Minuteman sijo or its associated Launch Control Center."<sup>39</sup>

"Our warning systems have progressed considerably further. U.S. satellite systems can now detect the launch of Soviet ICBM's and estimate their targets within a few minutes of the launch."<sup>40</sup>

Figure 6  
THE EFFECTS OF SOVIET COUNTER FORCE  
ON MINUTEMAN SURVIVABILITY



Source: DOD Annual Report FY 1980

The above quotations illuminate the two major technical advances that have increased the requirement for, and altered assumptions regarding Reflexive Launch Strategies.

1. Accuracy

As described in the threat section, significant accuracy improvements have increased the vulnerability of U.S. ICBM forces and proportionately increased the desirability of countervailing reflexive launch strategies. Additionally, significant U.S. accuracy and reliability improvements, achieved with the MM III, the Mark 12A reentry vehicle, the improved target modeling program, and the high speed retargeting system (Command Data Buffer),<sup>41</sup> have made Reflexive options more credible. Accuracy and reliability enable adoption of a countermilitary targeting policy for missiles launched during an attack. This not only insures highest use of land-based assets, but also avoids unintentional countervalue escalation (i.e., "city busting") and mitigates the consequences of an excessively lethal reflexive response to a limited, inadvertent/"accidental" Soviet counterforce attack (Hammurabi rules apply).

2. Potential for Secure Inflight Command Arming for RLS ICBMs

Unlike other technical advances (e.g., warning satellites) that have modified the assumptions about RLS viability, the existing technology to construct a secure inflight command

arm system has significantly altered the capabilities of RLS systems. During the 1970 ABM Congressional debate, this alternative was discussed by Paul Wolfowitz, who discounted the idea on technical and conceptual grounds:

Disarming our missiles in flight: Senator Gore, during a March 26 hearing, suggested that we might arrange some signal for disarming our missiles in flight, and "if it were discovered that an error had been made then the MINUTEMEN themselves could not be continued on their missions." This creates the problem that an enemy might discover the signal to disarm our missiles and use it; more important, there would be disastrous consequences, including possibly nuclear war, if one or two signals failed to get through after an accident launch.

Arming our missiles in flight: An earlier suggestion (by Senator Symington, in a hearing March 21) that we might launch our ICBMs "without arming them and arm them in the air," presents other difficulties. i) If our missiles were launched in a false alarm--even one deliberately triggered by an enemy--or if communications to them were blacked out in an attack, then we would be effectively disarmed. ii) If we could not convince the Russians that our missiles, launched by accident, were unarmed, the result might be nuclear war--particularly if they also followed a "launch on warning" policy.<sup>42</sup>

Technical evolution since 1970 has changed some of the assumptions in the above argument; as Dr. Garwin has stated:

...encryption algorithms and hardware exist now in abundance so that it can be made entirely impossible for any individual or nation to mimic the arming or disarming signal without actually capturing that signal. Furthermore, even one use of the signal for arming or disarming a portion of the Minuteman force can be arranged not to reveal a signal useful for another portion of the force or for use at a later time. Finally, given the survival of the assumed ground-based, mobile, powerful radio transmitters and the

special ("anti-jam") characteristics available to the communicator who needs to communicate reliably only a single "yes-no" decision, it can be made entirely infeasible for the Soviet Union to deny the accurate reception of such a signal.<sup>43</sup>

Such a secure communications system is similar to that conceived for a Launch Into Orbit RLS system:

...downlink jamming would be difficult because the jammer would have to be within 30 miles of the missile. The downlink pulse would have a unique signature of 1000 bits, further limiting jamming all communications without the anti-jamming pattern would be ignored.<sup>44</sup>

Contemporary electronic encryption and antijam techniques combined with dispersed mobile transmitters make feasible construction of a credible inflight Command Arm/Disarm system. Additionally, a policy of launching only a limited portion of the force would preclude the possibility of inadvertently (false alarm) disarming ourselves or being disarmed by a deliberate/inadvertent Russian feint.

The above technical and operational solution still leaves two major problems unresolved.

- A launch armed, command disarm inflight system would have to be not only technically feasible, but also operationally 100% fail-safe to be of advantage over LUA/LUAA. (All missiles would have to respond to a disarm signal.) Although, as stated earlier, such a system coupled to "surgical" counter-military targeting would be safer than a pure (irrevocably armed) LUA/LUAA system, the possibility of inadvertent detonation of even one set of 3 Minuteman III warheads presents a formidable risk.

- If the idea of a Command Arm/Disarm system is to allow for attack assessment error and/or faster response than the problem becomes as, Dr. Wolfowitz states: How do we convince the Soviets that the 300 or so incoming Mark 12 reentry vehicles are not armed? What if the Russians also rely on LOW or LUA?\* If we believe that the Russians would accept assurances (particularly during a crisis) that incoming warheads are not armed, then how could we believe that the United States would Launch Under Attack if the Russians gave us similar assurances? The Inflight Command Arm System (a concept designed to allow for "balks") presents as many new problems, complication and uncertainties as it attempts to resolve.

#### D. ALTERNATIVES TO REFLEXIVE STRATEGIES

The value of adoption of a reflexive launch strategy must be examined within the context of existing or potential alternatives. In addition to reflexive launch strategies, three major possibilities exist for resolving the impending vulnerability of land-based ICBMs.

- Develop a survivably based follow-on land-based ICBM system (e.g., canisterizing Minuteman III for deployment in vertical multiple protective shelters, and/or MX).
- Adopt a Dyad strategy employing bombers/ALCM carriers and SLBMs.\*\*
- Develop an ICBM active defensive system (i.e., ABM).

Technical evolution has altered the capabilities of potential system alternatives and attendant assumptions regarding their utility.

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\*The USSR has 70% of its total throw weight and 75% of its total (6000) warheads in fixed land base ICBMs that represent 56% of their total Bomber/Missile launch force. Source: DOD FY81 Annual Report.

\*\*SLBM is used here to include both existing Trident/Poseidon forces, as well as proposed systems such as the Shallow Underwater Mobile (SUM).

## 1. Survivably Based ICBM

In assessing the relative utility of employing the Minuteman system in an RLS posture as a solution to force vulnerability, the value of the basic weapon must be considered. An examination of the issues reveals that a replacement for Minuteman is desirable for reasons beyond pre-launch vulnerability.

In addition to the need for survivable basing, a new ICBM system is required for two main reasons:

- Military Capability - Increased throw-weight and accuracy are required to provide time urgent hard target kill potential (counterforce/countermilitary).
- Force Modernization - Minuteman 1 was first flown in February 1, 1961; Minuteman 2 achieved initial operational capability (IOC) in 1965 and Minuteman 3 IOC was 1970.<sup>45</sup> Force modernization is necessary not only to replace aging equipment that is increasingly more difficult to support, but also to take advantage of advanced in state-of-the-art reliability, maintainability, and total system operational effectiveness.

Any discussion of the use of pre-impact RLS as a "cost effective" alternative to a survivably based MX must include consideration of the fact that the Minuteman system is a 1960's era system facing a mid-1980's mission and threat.\*

## 2. SLBM and Bomber/ALCM Dyad

An obvious "solution" to the problems of Minuteman/vulnerability is to eliminate the target and shift forces

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\*See "RLS vs. MX Capabilities Comparison" (Figure 7).

Figure 7  
RLS (EXISTING FORCES)  
VS.  
MX (MAPS)  
CAPABILITIES COMPARISON

	RLS	MX
COST	+	-
ENVIRONMENTAL IMPACT	+	-
ABILITY TO REPLICATE THE CAPABILITIES OF THE ALTERNATIVE SYSTEM (e.g. MX CAN BE USED IN AN RLS MODE)	-	+
CERTAINTY IN REDUCING ICBM VULNERABILITY	-	+
EMPLOYMENT FLEXIBILITY (i.e. TIMING, ETC.)	-	+
MILITARY CAPABILITY: GROSS THROW WEIGHT, ACCURACY, RELIABILITY, EMT	-	+
SOLUTION TO THE PROBLEM OF FORCE MODERNIZATION (i.e. MINUTEMAN SERVICE LIFE; EMPLOYMENT OF STATE OF THE ART MILITARY CAPABILITY, RELIABILITY, AND OPERATING COSTS)	-	+
CRISIS STABILITY/INCENTIVE TO PRE-EMPT	-	+
DEMAND ON C <sup>3</sup>	-	+
DEMAND ON WARNING NETWORK	-	+
DECISION TIME	-	+
VULNERABILITY TO PIN-DOWN*	-	+

RLS (EXISTING FORCES) (con't)

VS.

MX (MAPS)

CAPABILITIES COMPARISON

	RLS	MX
CERTAINTY IN THE DECISION TO ATTACK	-	+
SAFETY/FREEDOM FROM MISCALCULATION OR ACCIDENTAL LAUNCH	-	+
TOTAL FORCE AVAILABILITY FOR LAA	-	+
ADVERSARY AND ALLIED <u>PERCEPTION</u> OF NATIONAL POWER AND WILL	-	+
AGGREGATE MILITARY CAPABILITY AND DETERRENT CREDIBILITY	-	+

NOTE: Signs (+ and -) indicate the comparative capability of the two systems. Although + is assigned to the superior system regardless of the degree of advantage, in most cases the marginal advantage is significant.

\*Although MX is vulnerable to pin-down, this vulnerability does not effect its employment after an attack. Pin-down is normally conceived of in the context of "pin-down and destroy", however, it could be used to prevent (temporarily) employment of MX counter-military or counter-silo capability.

to a bomber/ALCM and SLBM dyad. Such a decision would have to consider both the survivability (existing and potential) of land-based ICBMs as well as their offensive capability. Assumption of a dyad strategic posture could occur in two ways:

- Phasing out land-based ICBM's (possibly substituting air launched or sea-based alternative systems).
- Taking no action and allowing land-based ICBMs to become increasingly more vulnerable.\*

The effect of either of these approaches produces the same result--a loss of both perceived and actual military capability. Although the unique capabilities of ICBMs are detailed in Figure 8, one area deserves specific attention. Of greatest significance in any consideration of the value of land-based missiles is their synergistic role within the Triad. Because ICBMs have a distinct survivability mechanism, they--by complicating the Soviet's R&D and operational systems efforts--increase the survivability of the other two legs.

As Colin Gray has stated:

Soviet leaders might come to believe that a counter-force first strike on a United States with a dyad would stand a reasonable chance of achieving a clear political victory. (It is not implied that the Soviet Union would seriously aspire to effect a total counter-force strike--only that Soviet bargaining strength for intrawar deterrence should be very great indeed after a surprise attack on an American dyad of SSBN and manned bombers.) Soviet leaders would, of course, need to calculate that the United States would

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\*This approach could be based on one of two theories: (a) the threat to land-based ICBMs is theoretical, but not actual; (b) ICBMs act as a diversion or "sponge" for large numbers of Soviet missiles. Both of these arguments are weakened by their reliance on unsubstantiated assumptions. Additionally, this alternative would undermine the perception of U.S. strength.

Figure 8

IBM

ADVANTAGES AND CAPABILITIES

- . DISTINCT VULNERABILITY
  - survival mode is different than SLBMs or bombers
- . ENDURANCE
  - the ability to indefinitely maintain the highest state of pre-conflict readiness
- . ENDURING SURVIVABILITY/AVAILABILITY
  - the ability to be selectively withheld or employed throughout protracted conflict.<sup>1/</sup>
- . ACCURACY
  - provides hard target kill capability and attack of select targets with minimal megatonnage and low collateral damage
- . C<sup>3</sup> SIMPLICITY, RELIABILITY AND REDUNDANCE
- . HIGH THROW WEIGHT
  - large payload allows for multiple, hard target capable warheads and penetration aids
- . HIGH OPERATIONAL RELIABILITY
  - missiles are: stored in a benign pre-launch environment; supported by extensive ground test equipment; continually accessible for maintenance; and fired under stable controlled, conditions
- . HIGH ALERT RATE/FORCE AVAILABILITY
  - at any time, virtually the entire force is available for launch
- . CAPABLE OF COMPLEX, COORDINATED ATTACKS AND HIGH SPEED RETARGETING
  - provides effective counter force/counter military potential.
- . LOW OPERATING COST
  - low personnel, upkeep and basing costs

. SOVEREIGN BASING

- Sovereign basing provides three advantages: peace time security and safety; freedom from dependence on neutral or foreign operating and basing areas; an attack on the force is unambiguous and requires violation of national sovereignty.

. MUTUAL SUPPORT

- provides increased survivability for bombers<sup>2/</sup>

Source: Author's assessment--see also: The FY 1981 Department of Defense Program for Research, Development and Acquisition, Part VI, p. 2; William R. Van Cleave, "The Strategic Triad," The U.S. War Machine, ed. James Dorman, Jr. (New York: Crow Publishers, Inc., 1978), p. 62; Gen. Lew Allen, USAF, Chief of Staff to Hon. Melvin Price, Chairman Committee on Armed Services U.S. Congress, House, 29 Dec 1978, Files Department of the Air Force; Colin S. Gray, The Future of Land-Based Missile Forces (Adelphia Paper Number 140) (London: The International Institute for Strategic Studies 1977), p. 3.

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<sup>1</sup>ICBMs are not susceptible to attrition during conventional conflict; they don't require refueling or replenishment and are not exposed to attack by a need for periodic return to vulnerable bases (as is the case for FBM submarines and strategic bombers).

<sup>2</sup>An SLBM attack on bomber bases would give adequate warning of an imminent attack on ICBMs; conversely, an ICBM attack on Minuteman launched to arrive simultaneously with an SLBM attack would provide adequate warning for the bombers. See--statement of Jan M. Lodal, in Hearings before the Committee on Foreign Relations United States Senate Ninety-Fifth Congress First Session 14, 19 January and 16 March 1977, ("United States/Soviet Strategic Options) (Washington: U.S. GPO), p. 92.

cooperate and choose to be deterred in such a situation; however, they could aim to achieve a nuclear Pearl Harbor against the 40 percent or more of the Poseidon-Trident fleet that is always in its home ports or at forward bases (Holy Loch and Guam) and hope to catch a large fraction of the B52/FB-111A force before it could reach its safe escape points, thus leaving the United States Government in a terrible dilemma.<sup>46</sup>

The essence of the argument favoring land-based ICBMs is not that they are inherently invulnerable, but that they possess vulnerabilities different from those of bombers/ALCM and SSBNs. This difference assures that all three systems cannot be nullified by concentration on a single technological defense solution. Additionally, ICBMs provide unique military capabilities such as secure C3, high alert rate, and superior operational accuracy.

### 3. Advanced Sea-Based Alternatives

Technological evolution promises to alleviate three of the major comparative deficiencies of SLBMs:

- Range/throw-weight - Trident I (C4) and Trident II (D-5) if developed) vastly increase the range of SLBMs.<sup>47</sup>
- Accuracy-Trident I (C-4) has significant accuracy improvement and the MK500 MARV (under development) has the potential to provide SLBMs with counter-force capability.<sup>48</sup>
- C3 - Construction of the Extremely Low Frequency (ELF) communication systems would improve survivability by not forcing Trident subs to trail antennae or operate near the surface. Additionally, advanced communications systems such as satellite-laser systems could enhance SSBN C3.<sup>49</sup> The problem is that neither of these complementary SSBN communications systems presently exist nor are they in the budget:

Serious political problems have virtually blocked plans to build the ELF systems<sup>50</sup> and the blue-green laser system hasn't even been tested.\*

These and other less dramatic advances in existing and potential technologies have changed some of the major assumptions regarding the military capability of sea-based systems. However, as stated earlier and as seen in Figure 8 ICBMs have a significant number of distinct advantages relative to the other two legs of the Triad. Technological advance is a two-edged sword and the same phenomenon of geometrically enhanced technological progress that promises significantly more capable sea-based ballistic missile systems, could result in increasing detectability and vulnerability.

One recently proposed solution to the problem of land-based ICBM vulnerability is deployment of a Shallow Underwater Mobile (SUM) sea based ballistic missile.<sup>51</sup> This system would consist of two ICBMs strapped outside the pressure hull of each of a fleet of small diesel powered submarines. The SUM system would solve the accuracy and C3 problems of sea systems through dependence on shore-based navigation and communication facilities. Figure 9 presents an MX/SUM comparison. The key problems with such a system include vulnerability to underwater nuclear effects (on the

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\*The Defense Advanced Research Projects Agency plans to award two contracts for developmental efforts for this system.<sup>52</sup>

Continental Shelf), lack of distinct vulnerability, alert rate, and operating cost. As Lt Gen Kelly H. Burke (DCS Research, Development, and Acquisition) states,

A sea-based system now being suggested by a few individuals outside the Department of Defense is the SUM, or shallow underwater missile system. A careful evaluation of the concept shows these submarines are neither as small nor as inexpensive, nor as readily available as first thought. In any event SUM is simply another ballistic missile submarine without the characteristics of land-based ICBMs and as such should logically be considered as an alternative to the Trident, not to the MX.<sup>53</sup>

In a later statement Burke added:

...Among these schemes are deploying a mobile Minuteman force, putting ICBMs on small German-built diesel-powered submarines operating along the Continental Shelf, or deploying MX in the Great Lakes....

In the second case, the so-called SUM "bottom-crawling-submarine" would not be available until the 1990's and would be highly vulnerable to tidal waves, known as the Van Dorn effect, that could be induced by a Soviet barrage bombing of the Continental Shelf area. This tidal wave in shallow water would crush any sub in its path. Once aware of this phenomenon, the proponents of this approach switched to a "Deep Underwater Missile," or DUM, which would make such a weapon an alternate for the Trident SSBN, rather than for the ICBMs. In case of MX ICBMs deployed in the Great Lakes, barrage bombing, in a similar manner, would rapidly and surely destroy such a force.<sup>54</sup>

This view is supported by the Under Secretary of the Air Force, Antonia Chayes, who states:

...Besides, we looked very hard at this so-called Shallow Underwater-Missile System\* and have concluded that there are defects. It cannot operate from the Continental Shelf--as its advocates argued

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\*This system (SUM) is called Shallow Underwater Mobile (not Missile) by its principal supporter, Dr. Sidney Drell.

Figure 9

SHALLOW UNDERWATER MOBILE (SUM)  
...SOME PROBLEMS

	<u>SUM</u>	<u>MX</u>
ALERT RATE/ENDURANCE	3	1
DISTINCT VULNERABILITY	3	1
POTENTIAL NEAR TERM VULNERABILITY (EXISTING ASW TECHNOLOGY AND NO SITE DEFENSE)	1	2
OPERATING COST (PERSONNEL, OVERHAUL, FUEL, ETC.)	2-3	1
PROCUREMENT COST	?	?
LOW DEVELOPMENT RISK	3	1
C <sup>3</sup> SIMPLICITY/VULNERABILITY	3	1
OPERATIONAL RELIABILITY	3	1
MILITARY CAPABILITY (ACCURACY, PAYLOAD, FLEXIBILITY, CONTROL)	3	1
NAVIGATIONAL AUTONOMY (SIMPLICITY/VULNERABILITY)	3	1
SOVEREIGN BASING/PEACE TIME SECURITY	2-3	1
DOMESTIC/ENVIRONMENTAL IMPACT	1	3

COMPARATIVE SYSTEM RATINGS

- 1 CLEARLY SUPERIOR
- 2 SOME ADVANTAGES
- 3 CLEARLY LESS CAPABLE

originally. It would be vulnerable there to the effects of an attack that would create a tidal wave.

Also, an analysis of the equipment required to keep these submarines stable would indicate that quite big submarines would be needed. So it becomes a very expensive proposition and offers no savings over the MX system for the same number of warheads.<sup>55</sup>

Finally, as an alternative to Reflexive Strategies, the SUM system shares with other new/derived technologies, the problem of development and deployment time. As Bernard T. Feld and Kosta Tsipis state:

Such a coastal submarine-based system could not be ready for deployment in the next decade or so. Therefore this system shares with the air-mobile and the multiple-shelter basing mode the disadvantage that its unavailability for many years might mandate the need for immediate remedial measures (such as local defense for Minuteman silos), which would add to the overall cost of restoring invulnerability to the ICBM component of the U.S. strategic triad.<sup>56</sup>

While a case can be made that a SUM system could be deployed in less than a decade, it cannot solve near term (mid-1980's) land-based ICBM vulnerability.

#### 4. ABM Alternative

In addition to survivably based system, the other major alternative to pre-impact reflexive launch strategies is a missile site defense ABM. Several concepts have evolved involving the use of non-nuclear kill mechanisms and state-of-the-art simplified multi-target-track fire control systems.<sup>57</sup> One of these programs, Homing Overlay

Experiment (HOE) is scheduled for testing in 1982. DOD is also examining several variants of a Low Altitude Defense (LoAD) system for terminal defense of missile silos.<sup>58</sup>

Although these ground-based (and future space-based) defensive systems appear practical, they have three major problems:

- Most ABM proposals would require abrogation or restructuring of the existing ABM accords.<sup>59</sup>
- Unless a massive effort is undertaken, they would not resolve Minuteman vulnerability before the late 1980's.
- Unlike a passive defense (i.e., survivable basing), ABM systems would always be potentially vulnerable to countermeasures and uncertainty\* would always exist relative to their (untestable) full scale operational capability.

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\*This uncertainty, however, is a "two-way street:" the Soviets (regardless of developed countermeasures) would have uncertainty regarding their ability to successfully attack the system.

V. THE CURRENT ROLE OF REFLEXIVE STRATEGIES

...Nor could they be sure that we would not launch our ICBMs on warning or under attack (as we would by no means wish to rely on having to do).<sup>60</sup>

Harold Brown  
January 1980

...the second option toward which the United States is edging, *faute de mieux*, is to adopt the ICBM firing tactic of launch on assessment (LOA). Senior Carter administration defense officials have been uttering more and more friendly references to this tactic. For a country with a \$2 trillion GNP and a defense budget of more than \$120 billion--after nearly a generation's warning that the silo-vulnerability problem was coming--to be compelled even to think very seriously about LOA is little short of a disgrace.<sup>61</sup>

Colin S. Gray  
July 1978

A review of recent formal and informal official statements concerning employment of reflexive launch strategies, creates an initially ambiguous--even paradoxical--picture of U.S. policy. For example, in his 1980 DOD report, Harold Brown said, "...But that does not mean we should abandon the features contained in the ICBM force or make its survival a function of launch-on-warning."<sup>62</sup> However, in a later section of the same report he adds: "Very low survivability of ICBMs in the early 1980s will leave us with very little effective quick response hard target kill capability unless we were to adopt a

launch-under-attack policy."<sup>63</sup> He further states "...In addition, the USSR can never be sure that our ICBM force would not be launched under the attack, increasing the number of U.S. delivered warheads still further."<sup>64</sup> Similar statements have been made by other administration officials. According to William J. Perry (Under Secretary of Defense Research and Engineering), "An attacker could not be certain that the Minuteman force would be launched before it was destroyed, though we do not want to depend on that uncertainty."<sup>65</sup> Under Secretary of the Air Force Antonia Chayes in a recently quoted statement indicates that we do not have a launch-under-attack doctrine, but could adopt one:

We could ignore the vulnerability and basically change our strategic doctrine. We could move to a launch-under-attack doctrine--that is, we could launch our ICBMs as soon as we detected evidence of a Soviet attack.

Secretary of Defense Harold Brown only the other day explained why we would not wish to rely totally on that doctrine. He pointed out that so much can go wrong, we would not want to go to war by computer.<sup>66</sup>

The above statements of DOD policy--as well as those quoted earlier in this paper--seem to provide ambiguous and conflicting positions. Most of this ambiguity can be resolved by recognizing three factors:

- Reflexive launch strategies include a wide range of options\* within a framework of an infinite number of political/military scenarios. In other words, it is not enough to ask, "Do we want (have) a policy of "launch-on-warning?" Rather, we should ask, are there circumstances where the employment of an RLS is the obvious (or only) choice?

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\*This has been described in detail: See Figure 5 (page 40).

- The current situation is one of transition from essentially invulnerable forces to vulnerable forces--with the projection of a return to survivable land-based force posture. Any analysis of government RLS policy statements must include consideration of tense (stated or implied) (i.e., does the statement refer to current policy or future options).
- The difference between a "veiled threat" and a strategy that is dependent on reflexive response is significant. The major objective of reflexive launch options--like the weapons themselves--is to deter attack. As Richard Garwin states:

Our preference by far is to avoid war with the Soviet Union, including war initiated by the Soviet Union with the expectation of achieving benefits worth the threats of substantial loss to the Soviet Union. Although it would be desirable to have forces which are capable of surviving nuclear war and carrying out orders of the U.S. Government during the course of such a war, it is more important to deter nuclear war. Therefore, there is a role for doctrine for the use of a capability for launch under attack/launch on impact, as well as for declaratory policy which informs others (more or less accurately) of our capability and intent.

Doctrine and the declaratory policy cannot diverge very much for the United States, given our relatively open system of government and press. This makes more difficult the problem of establishing the doctrine and declaratory policy, but eases the task of writing about them.<sup>67</sup>

Colin Gray also noted the deterrent value of declarations of the possibility of employing reflexive responses:

...but handled properly, LOW has some deterrent merit. As an operational firing tactic, it would be monumental folly, but as a veiled suggestion of the 'we refuse to rule it out' variety it should not be despised. Responsible decision-makers must retain a small suspicion that the adversary might just launch some missiles before the incoming warheads arrived: one should not attempt totally to allay this suspicion.<sup>68</sup>

Current public policy statements such as the following one by the Department of State support this concept of "veiled suggestion:"

...and would the United States launch its own ICBMs once, it was determined that a massive Soviet ICBM attack was underway, thus leaving only empty holes for the Soviet missiles to hit.<sup>69</sup>

Similarly, Secretary of State Vance in a quote from a recent television interview said, "No one should assume those missiles wouldn't be launched before they were struck by incoming missiles."<sup>70</sup>

Harold Brown reinforced this concept of deterring uncertainty in stating, "And they would face a considerable risk that we could\* launch all or part of our ICBMs before they could be destroyed--thus frustrating whatever objective the Soviet attack might have had."<sup>71</sup>

The most current and definitive statement of United States RLS policy is contained in the 1981 DOD Annual Report:

Why should we not settle for the new status quo and plan to launch our ICBMs on warning, or replace MINUTEMAN--if we must replace it at all--with what some would call a less threatening (meaning less versatile and effective) system than MX?

These questions have several answers. The first is that it is one thing (and by no means an easy one\*) to have an operational capability to launch nuclear weapons, with warning or under attack. It is quite another matter to be obliged to launch them simply to avoid losing them to the attacker. The latter posture, with its vulnerability to accidents and false alarms, and still more with its premium on hasty action rather than deliberation and control, is unacceptable to the United

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\*Emphasis added.

States. In a given situation, the President may decide to order a launch, with or without warning. The duty of the Department of Defense is to plan and procure systems so that the force can ride out an attack if that is what the situation calls for, and what the President directs. It is not our duty to force his hand.<sup>72</sup>

Thus it can be seen that it is not that the current U.S. policy is ambiguous, but rather that this question is a complex admixture of varying political, technical and timing elements. It is clear from the above statement as well as procurement initiatives that the current U.S. policy is to restore land-based missile system survivability as well as to enhance the capability for reflexive response. This RLS potential is designed to act as an element of general deterrence and to provide an operational capability for rapid response under appropriate situational conditions.

#### A. THE PARADOX OF "INTERIM SOLUTIONS"

As stated above, analysis of the utility of RLS options must be tied to both timeframe\* and the political/military scenario. Comprehension of this timeframe concept aids in alleviating apparent ambiguity in both strategic literature and government statements. For example, many of those who (like Secretary of Defense Brown) believe that a survivable land-based ICBM is the only appropriate permanent solution to existing force vulnerability, see at least a threat of RLS

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\*Timeframe refers to the state of the strategic balance (e.g., today's balance vs. 1983 relative force levels and capabilities).

employment as an acceptable interim element of general deterrence.

Viewpoints regarding reflexive options generally fall into three main categories.

- Those who abhor any use of RLS threats or operational doctrine.
- Those who support RLS as a permanent solution to land-based ICBM vulnerability.
- Those who see some utility in RLS as a part of general deterrence and/or a "valuable backstop if either super power found itself temporarily embarrassed by technical surprise or a tardy response to the development of an advisory counter-force capability.<sup>73</sup>

A large proportion of strategic thinkers fall into this third group. They view reflexive options as a strategic "spare tire:" their availability provides added confidence when the strategic system is strong and in times of strategic setback they provide an interim solution. This analogy of RLS as a sort of "spare tire" aids in resolving the paradox of "interim solutions:" that is, if RLS is acceptable as an interim solution, why is any further action required? As Patrick Parker has said, "This is the problem of all 'interim solutions'--they tend to be viewed as permanent cures."<sup>74</sup> The other principal argument opposing reflexive options--as even an interim solution--is that the extensive cost and effort required to construct a credible RLS system could better be applied to accelerating a more robust and lasting solution. Although an excellent case exists for accelerating critically required force modernization, the

hardware and analysis required to develop an enhanced RLS capability is needed for other vital purposes\* and thus RLS may be viewed as a kind of "free" option.

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\*This subject is discussed in depth later in this paper.

## VI. ISSUES AND PROBLEMS

### A. TARGETING FOR RLS

However, an important issue surrounding the launch-under-attack option is "launch what against what Soviet targets--upon what degree of evidence that an attack of what size is underway against what U.S. targets?"<sup>75</sup>

Paul H. Nitze  
February 1979

One of the principal objections to reflexive response is the targeting issue. This argument has its roots in what M. R. Gustavson calls the concept of "launch-to-destruction-on-warning."<sup>76</sup> This concept--espoused primarily by those who attempt to totally dismiss reflexive options--conveys an image of an RLS as automatic escalation to an all-out counter-value retaliation. Upon close examination, it becomes clear that the false premise on which this argument is based is that there are essentially only two types of targets--missile silos or populations.

The argument against countervalue/population targeting for reflexive retaliation is the obvious one of unthinking, and possibly unwarranted, escalation. As Donald R. Westervelt has written,

The concept of launch-on-warning has been deplored in the context of a spasm-response countervalue-oriented strategic emphasis. It is quite a different situation when counterforce objectives are primary, when an opposing force is known to have the characteristics imputed to future Soviet forces, and when the warning is based on observation of an attack as massive as would be necessary in any attempt to disarm us.<sup>77</sup>

The case against a countersilo RLS is that we probably would not know which silos were empty and would thus expend hundreds of warheads to no avail. Further, it has been suggested that even if we did have knowledge\* of the distribution of Soviet reserve ICBMs; a U.S. countersilo RLS would force escalation by driving the Soviets to exercise a launch-on-warning of their residual (countervalue) forces. A final (game theory) argument against counterforce RLS is that, given a number of assumptions, we would not improve the numbers balance in such an exchange. As T. K. Jones has stated, We have done some analysis of launch-on-warning. Assuming the Russians would launch if we did, we have found that we are worse off if both sides do it."<sup>78</sup> The question of relative advantage resulting from reflexive counterforce response to a Soviet first strike--like all simulations--is most significantly influenced by the assumptions (i.e., accuracy, reliability, etc.); however, ICBM throwweight advantage results in a Soviet numerical superiority as the "bottom line" of most of these calculations.

The fact that populations and silos are not appropriate targets for reflexive responses should not be equated with a paucity of targets. As Marshal Grechko has written:

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\*This knowledge could be based on real-time reconnaissance and/or best estimate analysis (e.g., SS-18s would not be one of the targets).

The Strategic Missile Forces, which form the basis of the combat might of our Armed Forces, are intended for the destruction of the enemy's means of nuclear attack, his large troop formations and military bases, the destruction of the aggressor's defense industry, the disorganization of (his) state and military command and control, and the operations of his rear and transportation.\*79

Soviet writings are a useful source for compiling "appropriate" RLS targets for it is, after all, the Soviets whom we would attempt to deter through adoption of an RLS posture. Colonel M. Shirokov suggests some other possibilities:

In determining these targets, application should be made of the industrial branch principle and the selected critical links in the economy....<sup>80</sup>

Shirokov suggests large power stations, oil storage/production, large blast furnaces, steel plants, chemical facilities, rail yards and other transportation centers.<sup>81</sup>

Richard L. Garwin recommends a similar target mix for reflexive forces:

Since it is inefficient to attempt to produce such damage to the Soviet ICBM force, the targets should be the highest-value targets in the conventional military forces (divisional headquarters, marshaling yards, troop concentrations, and the like), and the United States should attack directly massive industrial and infrastructure investments up to a number which would result in a similar level of casualties on the Soviet side. This would mean primarily military-related industry, nuclear-energy facilities, dams, aircraft concentrations, and the like, including installations for defense against attack by neighbors of the Soviet Union.<sup>82</sup>

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\*Emphasis added.

Roger Speed presents a different "problem" associated with RLS target selection:

The primary reason for maintaining a triad of strategic forces is to guarantee that, at a minimum, the United States can maintain an assured-destruction capability to deter an all-out attack on American cities. If a Soviet attack were directed only at U.S. strategic forces, the launch-on-warning policy would be faced with a dilemma. If the U.S. ICBMs were directed against Soviet cities, this would assure that U.S. cities would also be attacked, which is the opposite of what is desired. If, on the other hand, U.S. ICBMs were directed against Soviet military targets instead of cities, they would no longer be available to deter attacks on U.S. cities. In either case, a LOW policy fails to serve its main purpose--to maintain a U.S. assured-destruction capability. \* 83

The above analysis contains three major flaws:

- It does not consider targets other than "cities" (population) or "military targets." Examples include isolated manufacturing and energy facilities as well as dams, transportation centers and other key targets.
- It implies that the principal value of the U.S. ICBM force is countervalue deterrence. While Minuteman could be used in a countervalue/countervalue deterrence role, its primary advantage lies in its accurate hard target kill potential.

As the FY1980 JCS Military Posture states:

The Minuteman II's long range accuracy and single warhead provides a weapon for use against some hardened targets.

...Modernization programs include an improvement in accuracy on all missiles and the replacement of the MK-12 reentry vehicle (RV) with the MK-12A warhead on 300 Minuteman III ICBMs in FY1980-1982. These improvements will help the United States maintain current capability against an increasingly hardened Soviet target base. 84

In 1974, Secretary Schlesinger made a similar analysis:

My own judgment is that the ICBM force always had a role to play except in the assured destruction notions which were regarded by some as a deux ex machina as a substitute for thinking about the program.<sup>85</sup>

Harold Brown uses the following assumptions in an analysis of U.S. response to a Soviet counterforce attack.

We assume that the initial Soviet attack uses ICBM warheads against U.S. silos, forward-deployed SLBM warheads against time urgent C<sup>3</sup> and bomber ports and other supporting installations. The U.S. retaliatory counterforce attack uses surviving ICBM and SLBM warheads against Soviet bomber bases, SSBN ports and hardened C<sup>3</sup> targets, and surviving ICBM and bomber warheads against Soviet silos.<sup>86</sup>

Speed fails to account for the deterrent value that would remain in SLBMs and the bomber/ALCM force regardless of the disposition\* of the ICBMs.

- The motivation for a launch-on-warning policy is not "to maintain a U.S. assured-destruction capability;" the purpose is to deter a pre-emptive, counterforce attack and, failing that, to exercise time-urgent hard/semi-hard target kill capability.

Although the concept of reflexive response is hindered by many complex--and perhaps insurmountable--problems, a shortage of appropriate targets (short of a full scale countervalue response) is not among them. As Soviet Major General Anureyev has written:

For undermining the enemy's strategic potential there is no need for its complete destruction. For this it can be sufficient to put out of action one of its most important elements. In this

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\*Launched-under-attack or destroyed in their silos.

connection an enormous role is acquired by the working out of the scientific criteria and principles of selection of targets, and also the means of influencing them. The qualified solution to the given problem requires the participation along with military specialists, of economists, sociologists, engineers, and physicians.<sup>87</sup>

#### B. RLS FORCE COMPOSITION

Closely associated to the targeting issue is the question of RLS force composition (i.e., How many do we launch?). The prevalent assumption is that launch-on-warning/under-attack implies launching the entire force to prevent its destruction. As Paul Wolfowitz testified, "If our response were in fact to be as swift and certain as it is supposed to be, any attack no matter how small or controlled, would result in total war."<sup>88</sup>

A full scale launch of several thousand Minuteman warheads--even if aimed at military targets--would result in significant numbers of Soviet casualties, as well as loss of residual U.S. prompt hard-target kill capability. Alternatively, retention of large portions of the force, in the face of an effective all out counterforce attack, would result in its loss. Additionally, a gray area exists involving the question of how to respond to a small scale or accidental attack. Richard Garwin supports a tactic of launching a portion of the force equipped with a modification to allow a delayed arm commitment:

Only a limited number (say, 50) of Minutemen need or should be launched--unarmed, subject to command-arm in flight. One hopes that launch-under-attack will never occur inappropriately, in response to false indication of sensors, or other cause. Should such an unwarranted launch occur, however, we would prefer not to have armed the missiles, nor would we want to disarm ourselves by having launched the entire ICBM force, which would thus be lost to our future capability...It seems reasonable that no more than 50 percent of the Minutemen need be considered for launch under attack even in the event of what appears to be an attack against the entire force. This conclusion stems from the observation that a pre-launch survivability of Minuteman of 0.5 would seem to preclude great enthusiasm for rebasing of the Minuteman force or for replacing it with an invulnerable force; hence, achieving the equivalent survivability by a commitment to launch as much as 50 percent of the ICBM force on attack should be adequate.<sup>89</sup>

The essence of Garwin's argument is not the defensive value of the proposal, but its effectiveness as a deterrent. A critical weakness in this plan, and in fact all reflexive remedies, is the problem of pin-down-and-destroy tactics. As Garwin himself acknowledges:

Depending on the actual number of megatons per minute required for pin-down, the SLBM fleet may or may not be able to prevent the launch of the Minuteman force. If it can, then the ICBM force could prolong this pin for several hours. Should the SLBM not be adequate to provide pin-down, it may be that an ICBM raid small enough not to trigger a launch-under-attack system could provide a continuing pin-down while a massive attack on Minuteman got underway. Thus, a pin-down attack might be a way of beating a launch-under-attack system, but only if the threshold for pin-down were low enough.\*<sup>90</sup>

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\*Emphasis added.

### C. PIN-DOWN

The Achilles' heel of reflexive concepts is the potential disabling effect of pin-down tactics. A pin-down attack consists of a vanguard of warheads detonated above the missile fields to create a mixture of nuclear effects\* that effectively prevents Minuteman launch pending arrival of the main Soviet counterforce attack.

There are two basic means of executing this tactic:

- Utilizing a small number of ICBMs to create uncertainty and inhibition of a launch-on-warning response. This approach relies on deception to pin-down the force prior to full scale attack.
- Employment of SLBMs for pin-down prior to attack. This tactic is the most probable and relies on the short time of flight (and warning) of an SLBM attack.

It is the possibility of an SLBM pin-down tactic that is the most devastating technical argument against reflexive strategies. The essence of the problem is that even with perfect warning, the reaction time from first indication to Minuteman launch must be less than fifteen minutes.\*\* If the thirty minute flight time of an ICBM stresses the capability of a reflexive system, then the less than fifteen minute decision window of a pin-down scenario virtually destroys the credibility of the entire concept. However, as has been stated earlier, to determine the credibility of a reflexive

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\*Electromagnetic pulse (EMP) to disturb electronics, radiation to damage warheads and dust and blast to damage missile structures.

\*\*Use of depressed trajectory SLBM would provide less than 10 minutes' warning; see Francis P. Hoeber, Slow to Take Offense, p. 21.

response, the entire spectrum of political-military situational factors must be considered. For example, if the PAVE PAWS SLBM warning radar reports a massive launch that is the culmination of a deteriorating political crisis accompanied by extensive Soviet mobilization including significant numbers of forward deployed SSBNs, then a reflexive response capability might be a credible deterrent.

Although considerable uncertainty exists concerning the real-world effects of any pin-down attempt, it still remains the most significant problem affecting reflexive options.

As Paul Wolfowitz states:

The vulnerability of ICBMs during the first stage of flight means that even a few overhead detonations would prevent us from launching Minuteman. Thus we could never be certain that an attack was really a "limited" one, and not one designed to keep our missiles in their silos until a full-scale attack arrived.

We would thus have to respond before the arrival of even a limited number of submarine-launched missiles. Such missiles can be fired from much closer to the United States along trajectories which would bring them to their targets in ten minutes or less. They could penetrate our present\* radar network with virtually no warning at all. Even with improvements in our warning system, there will be at most ten minutes for our entire response, from radar sighting through the actual firing of our missiles.<sup>91</sup>

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\*1970

D. "FAIL-SAFE" CONSIDERATIONS

But almost all who have looked at this problem agree that once we make it an accepted or standard procedure to fire ICBMs on warning, it begins to get very easy to write scenarios for accidental war. Indeed, one of the main reasons the current system can be considered relatively stable and in any way "acceptable," is that we assume the doctrine of both sides is not to fire on warning.<sup>92</sup>

Herman Kahn  
1969

One of the major hurdles facing construction of an RLS system and adopting a reflexive posture is the conflicting requirements of dependence on certain, rapid--virtually automatic--response and the need for a system that precludes inadvertent launch. Although these are not--theoretically--mutually exclusive design goals, those systems and procedures that optimize one of the above two goals tend to degrade the other.

As early as 1960, Herman Kahn commented on the problems of designing a "fail-safe" RLS system:

A complete positive control" reaction is not possible for the ICBM. It cannot "fail safe." Even if one had a destruct-mechanism, whereby ICBMs that were shot off by mistake could be destroyed in the air, it would not be satisfactory to react to a false alarm. First, it would be too expensive. Second, and even more important, we could not be sure that the destruct-mechanism would be 100 percent reliable. Therefore, it is quite unlikely that any order could or should be given to fire ICBMs on any but the most certain type of evidence.<sup>93</sup>

A decade later, Paul Wolfowitz drew essentially the same conclusion:

An obvious danger arises from the fact that any decision to "launch on warning" would have to be made in a short time and on the basis of early radar signals. The crucial judgment as to the reliability and significance of the signals would necessarily be made by technicians and military officers at the observation centers. The President would have neither the time nor the technical competence to question their evaluations. If the radar operators informed him that the signals could not yet be clearly identified as coming from Russian missiles, or if his scientific adviser (if he could be reached) suggested that the signals could possibly be the result of some natural phenomenon, or if reports were coming from some radar stations but not others, the President would want an explanation, but there would be little time to obtain one. Under such circumstances the danger of starting World War III by mistake would become frighteningly real.<sup>94</sup>

The technical advances of the two decades since Herman Kahn's succinct analysis of the systemic problem of designing a fail-safe RLS system have failed to change the basic weaknesses of the concept. As Fred Iklé recently remarked:

The more you lean on any such system, the more you are driven to make it taut and rapidly responding, which means that you're increasing the risk of some kind of short circuit. Making the system taut could also mean putting incredible responsibility on some tech sergeant in the innards of the system. The more quick and automatic it is, the more you're turning over decisions--the most fateful decisions in the nation's history--to people far removed from the President and the Joint Chiefs.<sup>95</sup>

Three events within seven months during 1980 substantiated Mr. Iklé's contentions. The first incident involved a NORAD computer mechanical malfunction that allowed an alert signal on a simulation tape to be broadcast to some of the strategic forces. Then, during one week in June,

two additional computer malfunctions "set off a false warning of a Soviet multiple missile attack."<sup>96</sup> In all of the above incidents the miscalculation was quickly discovered and the strategic force alert cancelled. It is precisely because the current strategic suite is not totally dependent on reflex for survival that disaster was averted in these three incidents. Additionally, reaction to these incidents was moderate (precautionary alert) because they occurred without other political or military signals.

Some analysts like William R. Graham believe it is beyond the state-of-the-art to design an accident proof "launch-on-warning" system:

Therefore, to be consistent with nuclear weapon safety requirements, the mandatory "Launch-on-Warning" system would have to be much less susceptible to unwarranted triggering than are individual nuclear weapons. For something so complex as the "Launch-on-Warning" system, satisfying such a safety requirement goes beyond the range of existing technical experience,<sup>97</sup> and becomes at best a highly speculative endeavor.

This concern is compounded by the requirement of insuring that weapons are launched in an actual attack. A reflexive system consists of two major elements, a communication system and a sensor network; Graham views both of these element as intrinsically fragile and thus susceptible to failure and/or attack:

...sensors tend to be fragile. As they must necessarily be rather sensitive devices, the possibility exists that they could be "jammed,"

or fed a high level of interference. They would also be subject to destruction by either nuclear or non-nuclear direct attack. The system would then degenerate to one of "Launch-on-Blindness" or "Launch-on-Loss of Sensor," rather than "Launch-on-Warning."

Communication systems contain long, tenuous paths separated by isolated nodes. Jamming has the potential to be effective against the paths, while the nodes may be subject to direct physical attack. Providing rigorous protection for either long communication paths or isolated and often unattended nodes has not in the past proven to even approach being practical.\*<sup>98</sup>

Finally, the final link in an RLS system is the President who must react quickly and determine if a launch is indicated. Given the automation and complexity of an effective RLS system, there is reasonable doubt as to whether a President would hesitate to take so grave a step based solely on sensors, signals, and readouts.\*\* As Deborah Shapley states:

Politically, a launch-on-warning policy would raise a storm of domestic controversy, not only from arms controllers, who would worry about the dangers of such hair-trigger launches, but from conservatives who would complain that a President confronted with blinking machines and a horrendous choice might hesitate, do nothing for 25 minutes, and lose his <sup>99</sup> land-based ICBM's without striking back in return.

#### E. THE POLITICAL PROBLEMS OF A "HAIR TRIGGER" DETERRENT

##### 1. Reaction Time and the Decision Process

If one word can be used to describe the fundamental

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\*Emphasis added.

\*\*It is one thing to react to a phone call that states "Mr. President, Minot is under attack"--it is quite another to respond to "...the PAVE PAWS system indicates an SLBM launch"--(Eight minutes and counting).

flaw in any reflexive remedy to ICBM vulnerability it is time. Though existing technology has provided the maximum possible warning time, human limitation becomes the ultimate constraint.

Paul Wolfowitz in his definitive Senate testimony emphasized that time constraints are inherent in the human decision process (for so grave a decision) and are not simply due to "technical" (i.e., resolvable) deficiencies:

It is suggested that we would have twenty minutes of warning before an attack arrived. This is very little time just for making such a decision--to say nothing of first transmitting the warning to the President (whatever the time of day or night and wherever he might be), and afterwards transmitting the orders to launch. In addition time would be needed just to distinguish radar indications of an impending attack from the background of innocuous and spurious signals. There would be no time to clarify ambiguities in the radar signals, to investigate the source or the extent of the attack, or to adjust our plan of retaliation. The example of Pearl Harbor, and more recently, the Pueblo seizure, show that messages and warnings may travel slowly and arrive too late.

Steps would certainly be taken to speed the flow of information if our deterrent depended solely on timely warning. But a dilemma exists which no amount of care or expense can eliminate completely. By reducing the amount of checking and consultation and increasing the speed of our reaction, we would increase the risk that inadequate information or unauthorized commands could result in accidental war. A warning system which alerted the President at the first unidentified radar blips would, at a minimum, increase tensions--unless, like the "man who cried wolf," the warnings began to be ignored. At worst, such a warning system could start World War II by mistake. <sup>100</sup>

As Herman Kahn described the problem:

In analyzing the usefulness of any warning and reaction proposal, we should differentiate between the physical reaction time--that is, the time it takes the system to implement the order to institute any particular reactions--and the effective reaction time which includes the time for receiving information, evaluating it, and making the decisions to react in an appropriate way. The more innocuous the reaction and the better the information gathering and evaluation, the more automatic and fast we can afford to make the reaction.<sup>101</sup>

Although time is the crucial factor in the reflexive scenarios, many analysts have focused on the wrong aspect of this time constraint. Amoretta and Francis Hoerber, for example, have included target selection as a requirement of the decision process: "With almost zero decision-making time available, the policy question would arise, launch-on-warning against what?"<sup>102</sup> While it is true that, in many scenarios, the time required for the decision process may exceed the time available (and that target systems must be selected), the target issue has been overemphasized. A spurious element in the discussion of time constraints and the decision process is a dual part assumption:

- -that the specific response (i.e., force level and target(s) for a reflexive option must be developed "on the spot." Some observers attempt to paint a picture of a blar-eyed President in his pajamas toiling over a target map with six minutes to go before impact. In fact, detailed options can and must be preselected for a reflexive system. In such a system a selection would be made from a menu of appropriate responses.

- the second interacting and false part of this assumption is that if RLS is completely discarded and survivable forces constructed, decisions could be carefully developed in any post-attack\* environment. The point is that the same--previously discussed--vulnerabilities of reconnaissance and C<sup>3</sup> assets that might obviate RLS also severely limit the capabilities for post-attack analysis. It is simply not true that a "better" decision can be made through post-attack analysis: If the White House, the Pentagon, the CIA/DIA, the defense satellites, and communication links with forces/allies have been destroyed, can a "better"\*\* decision be made? Who would make such a decision and what would be its objective?

The question of decision-maker and the devolution of authority are also a problem for the reflexive system decision process. Richard Garwin suggests one solution:

Naturally, the NCA is not the person of the President but his duly constituted power, as provided by law. The preservation of NCA for the period of decision to launch under attack is a lessor problem than its preservation throughout a prolonged nuclear war. In particular, there should be a clearly designated line of devolution of the NCA authority in certifying the assessment of a massive Soviet raid on the ICBM silos so that the previously-taken decision to launch under attack will proceed; however, the President himself, having the authority to retrieve all powers of the President when he is in communication, would be able to veto the decision to launch, if his communications provide him with data on which he feels able to judge. A cryptographic authentication method will ensure that the veto comes from the President.<sup>103</sup>

Such a plan, however, has several serious drawbacks; as William Graham states:

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\*There is no doubt that survivable forces (e.g., MX) are required to markedly enhance deterrence and reduce incentive for attack.

\*\*i.e., "better" than during the trans-attack period.

Finally, the key person at the end of the chains, presumably the President, has historically proven to be vulnerable to small but determined attacks. Since there is no way to assure the survival of the President at all times, a predelegation of ICBM launch authority would have to be made if the "Launch-on-Warning" policy was to continue to be credible immediately following the removal of the President, a possibility that frequently could be under the control of the Soviets. Furthermore, the devolution of authority to a pre-delegated chain of successors to the President would have to be carried out so smoothly that not even minutes would be lost in establishing who was to make the decision to launch the ICBMs, locating him, and providing him with the necessary facilities and information. In addition to presenting another impediment to the timely operation of a launch-on-warning system, by increasing the number of persons who must be able to launch the ICBMs, the issue of pre-delegation and continuity of authority creates additional problems in the area of nuclear safety.<sup>104</sup>

In the final analysis, the answer to the question, "Is there sufficient time to exercise LOW/LUA?" is again dependent on the military/political scenario. Two basic possibilities exist:

- Escalation within the context of a political/military crisis.
- Surprise attack

In the first case, a "rational" excursion up the escalation ladder, a threat of reflexive response would be credible. International stakes, positions, and consequences would all have been calculated. Most significantly, as the situation deteriorated the requisite (attack/retaliate)

mind-set would exist to enable swift response. A crisis situation in which a significant portion of one side's forces are temptingly vulnerable is obviously an unstable one; but it is also this imbalance that makes the possibility of reflexive response a credible deterrent. The resulting crisis instability is the principal problem of vulnerable forces shielded only by the option of "quick-draw" tactics.

The second case, surprise attack, is more demanding. It is one thing for a President to order a launch-under-attack in the wake of a major confrontation while flying in the E-4 (Airborne Command Post). It is quite another to imagine the President being awakened at 0400 and told: "Mr. President, we have satellite and PAVE PAWS indication of a massive Soviet assault on the central U.S.--there are also conflicting reports of Soviet conventional mobilization. We have rechecked all our sensors and estimate first impact (SLBM) in five minutes." Such a chilling scenario--if possible--would virtually rule out a credible reflexive response. Although reflexive response is least credible for a "bolt from the blue" attack, a "bolt from the blue attack" is itself the least credible possibility.\* Even the classic "surprise" attack at Pearl Harbor cannot be considered to be a "bolt from the blue;" it occurred within the context of an already grave world situation. The problems

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\*However, the fact that a capability/possibility exists, demands development of defended or mobile ICBM forces.

associated with developing a disarming first strike that is supportive of rational political goals are as insurmountable as designing a foolproof launch-on-warning system. The key element of this assertion is the concept of rational goals. The enormous risks assumed by a Soviet initiated "surprise" thermonuclear attack would have to be balanced by the probability of achieving significant goals. To achieve such goals (e.g., occupation of western Europe) extensive preparation would be required. As Sidney Drell testified:

In particular he (T. K. Jones) calculates that "A full three-day evacuation of the type called for in Soviet plans would reduce fatalities to no more than 10 million people."

...We can assume that the United States would have at least three full days of intelligence available of ominous and imminent Soviet intentions as they evacuate their cities. Under these circumstances I can neither accept nor understand the assumption in his calculations that no more than one-half of our strategic arsenal would survive a Soviet first strike and be available for retaliation. To the contrary, an appropriate U.S. response in the face of this clearly provocative Soviet action could be to put our entire retaliatory arsenal on the highest status of alert and out on station. The President could announce furthermore that we are moving to a launch-on-warning policy for the duration of the provocation.\*105

Of greatest import is not that surprise attacks are improbable, but rather that they are possible. Throughout history surprise attack could and did occur; and although a surprise nuclear attack may not appear "rational,"

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\*Emphasis added.

rationality is a direct function of both circumstance (dynamics) and perception (values).

Technology has theoretically reduced the prospect of surprise, but the problem of too little data has been replaced by one of too much data. The sheer volume and attendant possibility of ambiguity could dictate hesitation and a failure to act promptly. Roger Speed offers some additional considerations:

Although the United States may be confident of its capability to detect an impending attack, the historical record gives little justification for such confidence.

...The predominant viewpoint is that although there are generally clear indications of an approaching crisis, these signals are usually lost in the noise of competing and contradictory signals. Others have argued that deception is the key to surprise. That is, background noise is not always just irrelevant information but often a deliberate attempt to transmit disinformation to deceive the other party. This was the case not only in Hitler's surprise attack on Russia but also in the Arab attack on Israel in 1973.<sup>106</sup>

The problem is that even if warning signals are available, they may be ignored. This results from what Speed describes as, "a tendency to 'mirrow image' and to act under the assumption that the other side shares one's own conceptual framework...."<sup>107</sup> Comprehension of the limitations of "mirrow image" analysis does not necessarily equate to gloomy prospects for the United States. As Joseph I. Coffey states:

One need not postulate either wholly rational or completely benevolent Soviet leaders virtually to rule out such a "strike from the blue" against NATO Europe (or against the United States). Indeed, one anthropologist characterized the belief that the U.S.S.R. might launch a first strike as "...a projection of our own (American) image of what happens when two opponents face each," and not as a realistic assessment of Soviet behavior.<sup>108</sup>

Unfortunately, analysis of Soviet writings does not support Coffey's contention. As Joseph D. Douglass, Jr., and Amoretta M. Hoerber have written:

The preponderant base of evidence in the Soviet literature designed for internal use calls for their striking first against the West with maximum surprise when the situation calls for war and when the factors are in the Soviet favor.<sup>109</sup>

A statement in Voyennaya mysl supports this analysis:

...And confidence in the success of a nuclear attack can occur in conditions whereby there is a sufficiently high guarantee that nuclear strikes will be delivered to the objectives of destruction, that a mass launch of ballistic missiles and takeoff of aircraft will occur for a relatively long time undetected by the country against which the attack is being carried out, and that the armed forces, and above all the strategic nuclear means of the enemy, will suffer such destruction that they will be incapable of carrying out a powerful retaliatory nuclear strike.<sup>110</sup>

While an isolated quotation from a Soviet military journal (circa 1968) does not equate to an inside look at the Russian game plan for WWII, it does shed some light on the questions of "minor imaging" and Soviet strategic logic pattern.

The problem with surprise attacks is not their high probability, but rather their devastating consequences. Although analysis based on averages, theory, and cost/benefit trade-off might support a case for maintaining a force "protected" only by firing doctrine, the consequences of miscalculation--no matter how "improbable"--are so grave that the risk is unacceptable. As Douglass and Hoerber conclude:

Therefore, although an attack out of the blue is often regarded in the United States as a "worst-case" fantasy and not "worth spending much money on" and although it may be impossible--by definition--to conclusively support the idea that anyone, including the Soviets, would deliberately start a global nuclear war, the converse, i.e., that they would not strike first, is extremely difficult to consider valid in the absence of an enormous change in the foundation of their underlying military thought--laws, principles, tactics, strategy, and doctrine. <sup>111</sup>

## 2. Soviet Perceptions

Analysis of the threat of counterforce attack and the offsetting utility of reflexive options must include an assessment of Soviet perception. Important to this analysis is Soviet perception of U.S. response and predictability; as Jiri Valenta has written:

Several times in the past, Soviet leaders had been unpleasantly surprised by U.S. responses, such as the U.S. intervention in Korea in 1950, Kennedy's blockade of Cuba in 1962, and the decision to bomb North Vietnam while Kosygin was visiting Hanoi in 1965. As Soviet Foreign Minister Gromyko once complained to U.S.

Ambassador J. L. Beam: "You're so unpredictable. We can't count on American policy."\*112

Soviet statements and literature demonstrate that they are well aware of the technical and political aspects of reflexive response. For example, in 1959, when the Soviets found themselves vulnerable to attack, they espoused RLS as a deterrent:

A vivid exhibition of national impulsiveness at the highest level of government was described by Averell Harriman in his account of a meeting with Khrushchev in 1959. "Your generals," said Khrushchev, "talk of maintaining your position in Berlin with force. This is bluff." With what Harriman describes as angry emphasis, Khrushchev went on, "If you send in tanks, they will burn and make no mistake about it. If you want war, you can have it, but remember it will be your war. Our rockets will fly automatically." At this point, according to Harriman, Khrushchev's colleagues around the table chorused the word "automatically."\*113

In the above performance, Khrushchev emphasized not only the force survival element of reflexive response, but also the need for adversary caution resulting from the Soviet Leader's "tenuous" control of force commitment. Although access to authoritative Soviet technical publications is limited, the following excerpt exemplifies Soviet consideration of a U.S.S.R. (or U.S.) reflexive response to counterforce attack:

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\*Emphasis added.

The combat readiness of strategic missile complexes is defined as the time required for preparing missiles for launch from different conditions. There are four classes of combat readiness, depending on the condition of the complex: transport, constant, high, and total combat readiness. The highest level of combat readiness is total combat readiness, characterized by time  $t_v$  for preparation and launch of missiles.

During designing of missile complexes, efforts are made to reduce  $t_v$  to a minimum. The reason for this is that as  $t_v$  is decreased it is possible to launch a large number of rockets before attacking warheads of the enemy fall upon the combat positions. However, a reduction in the time of preparation for launch and the launching of missiles is usually brought about by adding extra equipment. Therefore, it is accompanied by a reduction in reliability and an increase in the cost of the complex.\*<sup>114</sup>

In addition to espousing RLS advantages, the Soviets have also articulated the technical vulnerabilities of reflexive tactics:

A considerable threat to the intercontinental ballistic missiles are powerful nuclear explosions set off at great altitudes, because the impulses of electromagnetic energy created by such explosions can put out of commission not only the on-board missile equipment, but also the ground electronic equipment of the launch complexes.<sup>115</sup>

Joseph Douglass and Amoretta Hoerber postulate a Soviet strategy including the exploitation of these effects (time urgent pin-down and ICBM C<sup>3</sup> attacks):

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\*Emphasis added.

A U.S. launch-on-warning capability is a major concern of the Soviets may be the U.S. strategy that they assume in their analyses. It is quite possible that part of the motivation for stationing missiles in Cuba might have been-- and may still be--associated with the desire to strike extremely time-sensitive targets (e.g., command/control centers) before appropriate actions to launch the Minuteman missiles could be taken. In this regard, the Soviets recognize explicitly that one of the advantages of submarine-launched ballistic missiles is that they can be launched near the United States and, hence, have a shorter flight time. This enables the Soviets to increase the probability of destroying command/control and launch centers prior to the launch of the missile force. The submarine component of Soviet forces, therefore, may well be designed at least partially to be used early, rather than to be withheld, as has been the U.S. approach.<sup>116</sup>

Soviet military writing is dominated by emphasis on the element of surprise in conducting disarming attacks. For example, Lieutenant General Shuryrin stated that:

...one must keep in mind that the aggressors will not be able to make full use for their purposes of their strategic means of attack. A portion of these means of weapons delivery will be destroyed or damaged before their launching while they are still on their launch sites, bases and airfields: another portion will be destroyed or damaged by the weapons of the Air Defense in flight at the approaches to the territory of the socialist camp; still another portion of the missiles and aircraft will fail to reach their targets for technical reasons (i.e., malfunction).<sup>117</sup>

Recognizing the decisive significance of a surprise counterforce attack, the Soviets are prepared to employ reflex to counter it. This option will become even more important if the United States continues to improve its

hard target kill capability\* and the Soviet Union continues to maintain 75 percent of their warheads in fixed land-based ICBMs. L. Glagolev and V. Larionov in an article in International Affairs (Moscow) prescribe a solution to force vulnerability:

The first missiles and bombers of the side on the defensive (i.e., the Soviet side) would take off even before the aggressor's first missiles to say nothing of his bombers arrive.<sup>118</sup>

...Foreign military analysts' were said to be 'talking through their hats' when they claimed that 'Soviet nuclear rockets are highly vulnerable and (therefore) designed for a first and not a counter-strike;' 'An aggressor would be unable to destroy all the counter-strike means with his first salvo, for these means...are dispersed. A considerable part of them is constantly on the move. Another, even greater part, is in a state of almost instant readiness to take off. It is physically impossible--to knock out all the counter-strike means simultaneously.'<sup>119</sup>

Despite the extensive and sustained drive for ever increasing and throw-weight, as exemplified by the SS-18, the Soviets continue to contend that they are not building a first-strike counterforce capability. Trofimenko in 1977 stated:

The Soviet Union does not subscribe to the "first-strike doctrine." This fact is well known and has been reaffirmed recently by General Secretary of the CPSU Central Committee L. I. Brezhnev in his important foreign policy speech in Tula on January 18, 1977. Brezhnev described as "absurd and totally unfounded" the allegation that the Soviet Union "strives for superiority in armaments with the aim of delivering a 'first strike'...The Soviet Union has always and remains a convinced opponent of such concepts."<sup>120</sup>

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\*Minuteman/MK12A; the Advanced Ballistic Reentry System (ABRES); MX/AIRS; TRIDENT; and the Navy's MK500 MARV.

This disparity between observed Soviet capabilities and statement such as the one above can best be explained by the statement in Colonel N. F. Miroschnichenko's Military Herald article:

An indispensable condition for achieving surprise is secrecy. However, achieving it is not easy. For this, along with arrangements for countermeasures of the enemy's reconnaissance, it is necessary to perfect constantly the means and methods of camouflage and of disinformation, to raise the tactical training of officers, their knowledge of the enemy, his tactics, and his strong and weak sides.\*121

It is clear from the logic of Soviet hardware, despite the ambiguous character of Soviet pronouncements, that they maintain a capability for launch-under-attack and expect that the U.S. may--under the proper conditions--exercise its own RLS potential.

### 3. U.S. and Allied Perceptions

The launch-on-warning option is addressed reluctantly by strategic analysts who see it at best as an option of desperation. 122

Walter F. Hahn  
1978

...we are set on the road to launch-on-warning, a reckless and uncertain course of action that no nation with our resources should ever need resort to in desperation. 123

William R. Van Cleave  
1980

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\*Emphasis added.

To have a credible deterrent it must first appear credible to ourselves and our allies. This is one of the principal reasons RLS cannot be a substitute for survivable forces; the United States public and our allies would never be secure with such a tenuous and vulnerable posture. It is not RLS as part of an entire range of strategic options\* that would cause uneasiness, but rather a dependence on reflex for force survival.

As Johan J. Holst stated:

Nor would a doctrine which made deterrence dependent on a launch-on-warning (LOW) posture seem particularly attractive to an allied observer who is not only interested in the credibility of the American commitment to the defense of Europe, but also concerned about the possibility of becoming embroiled in a devastating conflict because of American miscalculations.<sup>124</sup>

Amoretta and Francis Hoerber see a more subtle perceptual problem surrounding the launch-on-warning issue:

- Launch on categorical warning might leave forever obscure in the eyes of the world the question of who really made the first nuclear strike. This is a nontrivial question, unless one assumes the world truly is wiped out in such an Armageddon-- in which case launch-on-warning is certainly madness.<sup>125</sup>

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\*For example, survivable forces could be upgraded to LAA as a deterrent during a crisis.

#### 4. Crisis Stability

The outcome of the crisis depends simply on who first finds the suspense unbearable. If the leaders on either side think the leaders on the other are about to find it unbearable, their motive to throw the switch is intensified.<sup>126</sup>

Thomas C. Schelling  
1966

If pin-down is the most critical technical problem of a launch-on-warning doctrine,\* then crisis stability must be considered its most serious political weakness. As Herman Kahn viewed the problem:

...Under some circumstances our vulnerability to a Russian first strike would both tempt the Russians to initiate a war and at the same compel them, because they might feel that we would be tempted to preempt for our own protection....<sup>127</sup>

Kahn's message is that vulnerable "deterrent" forces heighten paranoia and reduce crisis stability. The problem is further aggravated in a situation, like the current one, in which the Soviet Union possesses significant counterforce capability while we have much less. As Arthur Waskow summarized the dilemma of the deadly combination of counterforce with LOW as the "solution:"

With the pressure so enormous and the stakes so high, there can be little doubt that each side would be forced to try to fire first, preempting the other's attack. Every major international crisis would press both sides quickly to the brink of war, and if counter-force strategy had been highly developed, beyond the brink. Hair-trigger responses are built into counter-force strategy even if they are disclaimed by counter-force strategists.<sup>128</sup>

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\*See page 73.

## VII. THE FUTURE OF RLS

Because reflexive launch strategies are not sufficiently robust to be the primary shield for ICBMs, many observers would draw the erroneous conclusion that survivable forces (i.e., defended and/or mobile) could and should completely--and finally--eliminate the requirement for "hair trigger" response capability. This analogy ("hair trigger") is an appropriate one; although it would be unacceptably dangerous to have an individual's survival reliant on carrying a perpetually cocked pistol, we would by no means suggest that there are no cases in which the option to cock the gun--for deterrence or defense--would be valuable or even vital. Construction of vitally needed survivable forces will allow us to "uncock the gun," but it will not guarantee that reflexive capability won't be required in the future. Even with "survivable" forces, RLS may be required in two cases; unforeseen vulnerability and general deterrence:

- Unforeseen vulnerability of ICBMs or defenses:

Essentially, there is no "ultimate" weapon. For example, some defense analysts have argued that MX can be checked simply by increased Soviet fractionation:

If the U.S.S.R. were to respond to MX deployment by increasing the number of its warheads, it could defeat the proposed multiple-shelter scheme for each of 200 MX missiles simply by attacking all the shelters simultaneously.

AD-A092 300

NAVAL POSTGRADUATE SCHOOL MONTEREY CA  
REFLEXIVE LAUNCH STRATEGIES.(U)  
JUN 80 K A STRAUSS

F/G 15/3.1

UNCLASSIFIED

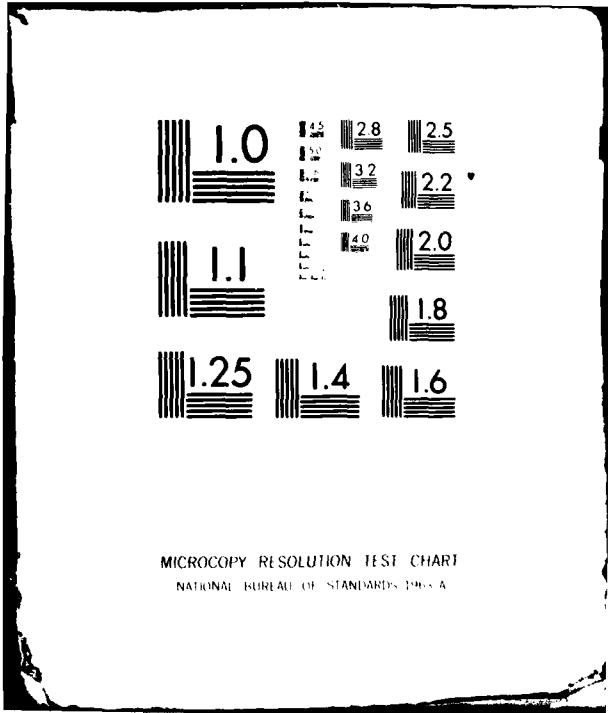
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

To make the shelters as protective as those for our current Minuteman ICBMs would be prohibitively costly; it also would invite the U.S.S.R. to set up a similar system, presenting serious new problems of verification for U.S. reconnaissance systems.\*129

The question does not revolve only around MX, but rather all strategic systems. The classic principle of Jomini still applies: Offense can saturate defense at its weak point. ABMs can be overwhelmed and even the "ultimate" strategic defensive weapons, space based lasers and particle beam weapons, require C<sup>3</sup> and tracking systems that are vulnerable to jamming and/or deception.

- The second case is general deterrence. The theory is that survivable forces simply shift vulnerability from weapons to the centers of political, military and economic power.

Preemption can work in two ways. First and more conventionally preemption can destroy weapon (i.e., land based ICBMs); a second more subtle effect is the ability to obviate the will and/or the capacity to launch these weapons. Now there is no doubt that despite the myriad of uncertainties involved in assuring the ability to destroy weapons, this task is far more predictable than the ability to destroy the will to act. However, the question remains that if we completely reject RLS (in this case launch-after-attack) even as a deterrent assertion, would we not be theoretically vulnerable to a

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\*The author does not support the contentions of this quote, but instead presents it to illustrate that theoretical vulnerabilities frequently emerge even before new weapon systems are "off the drawing boards."

counterforce (bomber/ALCM, C<sup>3</sup>, SLBMs in port, etc.)/counter-state attack? If, for example, Soviet SS-18s were retrained on Washington and the New York, Chicago and Los Angeles financial districts, could a preemptive strike cripple U.S. ability and/or will to retaliate? Simply stated a properly placed bullet in the head or heart can have the same "disarming" effect as one that destroys the gun itself. In 1962 Arthur Waskow discussed the same problem as it related to an earlier "survivable" strategic system:

Rational control must rest on extremely effective communications, and communications would surely be one of the first casualties of a thermonuclear war. It will be extremely difficult even to assess the damage to American forces caused by the first strike against us. Missilemen in one country will probably have no way of discovering whether the missile bases in the next county are still capable of firing. To get any clear picture of what damage we have done the enemy will be enormously more difficult. Assuming that an American government is still functioning after the attack, it will have to try to give orders without knowing its own surviving defenses, the power left to its own striking arm, or the targets still requiring destruction in the enemy's territory. <sup>130</sup>

If survivable forces are complemented by the ability and stated determination to respond swiftly (LUA or LAA), the incentive-however remote--to attempt to destroy the nerve center of the strategic systems is reduced.

Finally, the future may well provide significant advances in the key elements of a reflexive system. Improvements in sensors and C<sup>3</sup> could change many of the assumptions pertaining

to RLS. Of particular significance, would be development of a real-time, man-in-the-loop (i.e., space or ground-based) all-weather imaging ballistic missile warning sensor.\* As previously stated, it is unacceptable to expect a President to act based only on "flashing lights and radar blips," but if he could sit in his office and actually watch the 300 "SS-Xs" lift-off on his wall screen, then the decision process takes on a completely different character.

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\*This system like any system would also have its vulnerabilities.

## VIII. CONCLUSION

The emotion found "between the lines" of most references\* to reflexive options, results from over-simplification of what is actually a complex issue. Inconsistent nomenclature and incomplete definitions compound the problem: analysts frequently lump the entire RLS concept under the misleading (and emotionally charged) term "launch-on-warning." The third aspect of the problem of understanding the role of reflexive responses is the tendency to discuss RLS outside the context of a complete political-military scenario. Herman Kahn, in a 1969 article about the ABM systems, stated:

The worst (and it is typical of how extreme some people have gone in their opposition to this system) is that we fire our Minuteman missiles on fifteen minutes warning of an attack rather than follow the current procedure which is to have a capability for such firing but basically to expect to ride out any attack on our strategic forces before making any decision to fire. It is still worthwhile to have the capability to fire in a minute or so for a number of reasons. For one thing, it makes the opponent cautious. He can't be sure that you won't fire. For another, you may, in various circumstances, have to change doctrine at the last moment.\*\*131

Finally, RLS hardware is required, whether or not the doctrine is adopted. The critical RLS warning and C<sup>3</sup>I systems are also required for the bomber/ALCM carriers,

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\*E.g., Walter F. Hahn titled his editorial on the subject, "Launch in Desperation?"--Strategic Review, 6 (Summer 1978). (Emphasis added.)

\*\*Emphasis added.

submarines in port, civil defense, exposed mobile ICBMs and any possible future ABM system. As William Graham has testified, "Since the strategic bomber force does depend upon launch-on-warning for its survival, the U.S. must in any case maintain an elaborate attack warning system."<sup>132</sup>

Although reflexive options will continue to play a role both as an element of general deterrence and an interim backstop for current strategic force deficiencies, they do not provide sufficient depth or flexibility to be utilized as a permanent doctrinal shield for inherently vulnerable land-based ICBMs.

## FOOTNOTES

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