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ICBM AND STRATEGIC FORCE MODERNIZATION OPTIONS

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ICBM AND STRATEGIC FORCE MODERNIZATION OPTIONS

1. Introduction

This report summarizes the various ICBM and Strategic Force Modernization Options which have survived the screening processes applied in the recent past. The options considered in detail are as follows:

- o Option 1 - A minimum modernization involving deployment of ALCMS initially on B-52G's and ultimately on a new cruise missile carrier; Trident- missiles; and no upgrading of the ICBM force.
- o Option 2 - An MPS ICBM basing system is added to Option 1.
- o Option 3 - A road mobile ICBM basing system is added to Option 1.
- o Option 4 - An air mobile ICBM system is added to Option 1 along with replacement of some silo based Minuteman III missiles with the new ICBM.
- o Option 5 - An expanded new cruise missile carrier fleet is deployed, relative to Option 1; the Trident II missile is deployed in all Trident submarines and in 400 Minuteman silos, with Minuteman III being phased out.

The details of these options and their schedules are described in Section 2. Cost-effectiveness considerations are presented in Section 3. The Pros, Cons and Counter-Cons for the options are summarized in Section 4. Observations and recommendations are noted in Section 5.

Several appendices are included to provide additional data. These are as follows:

Appendix 1 - Description of the Road Mobile MX System.

Appendix 2 - Description of the Off-Road Mobile MX System.

Appendix 3 - Description of the MPS System.

Appendix 4 - Description of the Air Mobile MX System.

Appendix 5 - Summary of ICBM Basing Systems rejected from present considerations on the basis of previously reported results.

Appendix 6 - Summary of Analyses directed at answering issues raised about MPS in connection with verification, breakout, threat bounding and arms control compatibility.

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2. Description of Option

The five principal Strategic Force Modernization options are described in this section.

The ICBM Basing Options considered are MPS, Air Mobile, Road Mobile and Silo Basing. Other options have also been examined in the studies leading to this report, but many have fallen out along the way.

The Road Mobile basing options have been recently reassessed; however, results have not received wide distribution; Appendix 1 is included to provide a summary of the recent studies. Appendix 2 describes off-road mobile systems. The MPS and Air Mobile concepts are described in Appendices 3 and 4, respectively. Appendix 5 presents an overview of various other concepts which have received serious attention, but were eventually rejected before the final considerations reported here were made.

Appendix 6 is of particular importance in understanding the MPS System. It presents a review of the key issues of verification, breakout, threat bounding and arms control compatibility -- all of which have been raised as issues of concern in connection with MPS.

Option 1

This option represents a minimum modernization of the strategic forces, less than projected in the FYDP. Specifically, the MINUTEMAN silo-based force is retained with some deployment of Mk12A warheads and with essential maintenance as required; in the SLBM force, the TRIDENT-I missile is deployed on twelve POSEIDON submarines and on the new TRIDENT submarines; in the bomber/cruise missile force, ALCM's are deployed externally on the B52G and this deployment is eventually replaced by ALCM deployment on a new cruise missile carrier aircraft (CMCA) in the late 80's.

The details and schedules are outlined below:

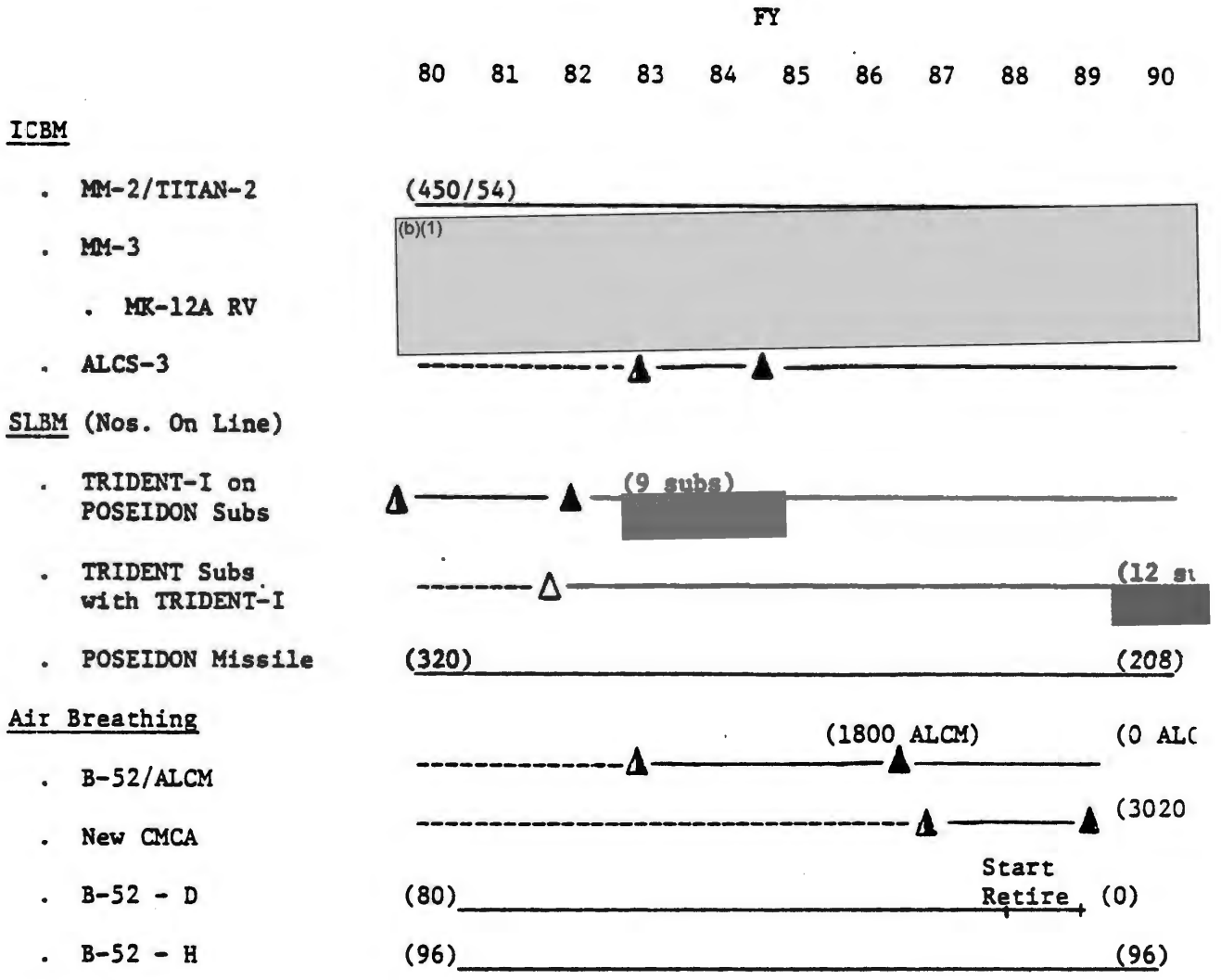
- o ICBM's
  - . Retain MM-2 and TITAN-2
  - . Deploy (b)(1) Mk-12A warheads on (b)(1) MM-3 by early 1983
  - . Replace aging missile propellant as required
  - . Deploy (b)(1) for the entire Minuteman force. (This allows (b)(1) from the (b)(1))
  - . MIRV reductions required for SALT-2 are taken out of MM-3. Result is a (b)(1) MM-3 level by 1986.
- o SLBM's
  - . TRIDENT-I missiles backfit in 12 POSEIDON subs by 1982
  - . POSEIDON sub maximum life of 30 years
  - . TRIDENT subs with 24 TRIDENT-I missiles each deployed at a rate of one every year starting in mid-1981 and three every two years starting in FY 83. Twelve subs on-line in FY 90. An FOC of 25 subs is achieved in FY 98.
  - . SLBM MIRV's peak at (b)(1) in FY 90 and reduce to (b)(1) in FY 98.
- o Air Breathing
  - . ALCM deployed externally on B-52G starting in FY 83 with FOC in FY 86.
  - . New CMCA replaces the B-52G with an IOC in FY 87 and FOC in FY 89.

- 3020 ALCM's deployed, 28 per CMCA
- CMCA is hardened, has fast-base-escape and is tanker-independent (28 ALCM to 6000 nm). Inland basing employed.
- Total active inventory (TAI) of CMCA is 119; 108 are on-line with a 50 percent alert rate.
- CMCA R&D starts in FY 80.

- B-52G's replaced by CMCA are "de-frodded" and retained as penetrators. B-52D's are retired accordingly. B-52H force is unmodified.
- Tankers transferred or retired from strategic inventory when CMCA replaces B-52G's.

- Summary Schedule - Option 1

Δ Start ▲ IOC ▲ FOC
--- R&D _____ Operational



Costs (FY 80 $)

Acquisition through FY 1990 - $49.5B

Life Cycle through FY 2000 - $153.6B

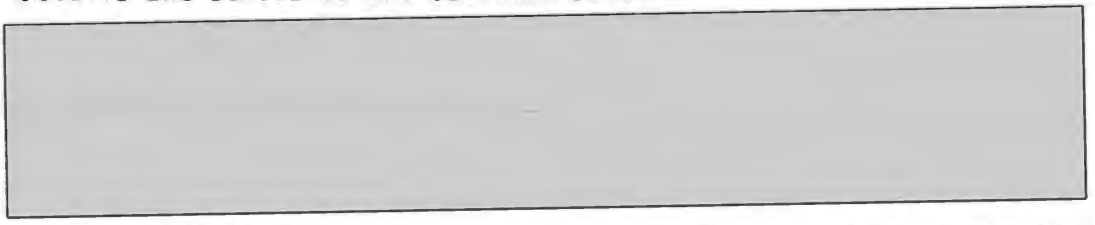
Option 2

This option includes ICBM force modernization by deployment of the Multiple Protective Structures (MPS) system. The largest missile permitted by SALT-2 is used. Two hundred of these missiles are deployed among 5200 shelters. IOC occurs in FY 86 and FOC in FY 90. MINUTEMAN III missiles are retired one-for-one with the new missile according to SALT-2 rules. The rest of the ICBM force, the SLBM force and the Air Breathing force is the same as in Option 1.

Appendix 3 describes the MPS System. Appendix 6 discusses some issues of particular importance.

Details and schedules are outlined below.

(b)(1)



- MINUTEMAN III deployment reduced one-for-one with new missile. By FY 90, MM-III reduced to (b)(1) (all with Mk-12A).
- Minimum changes to the rest of the force, as in Option 1.

o SLBM's

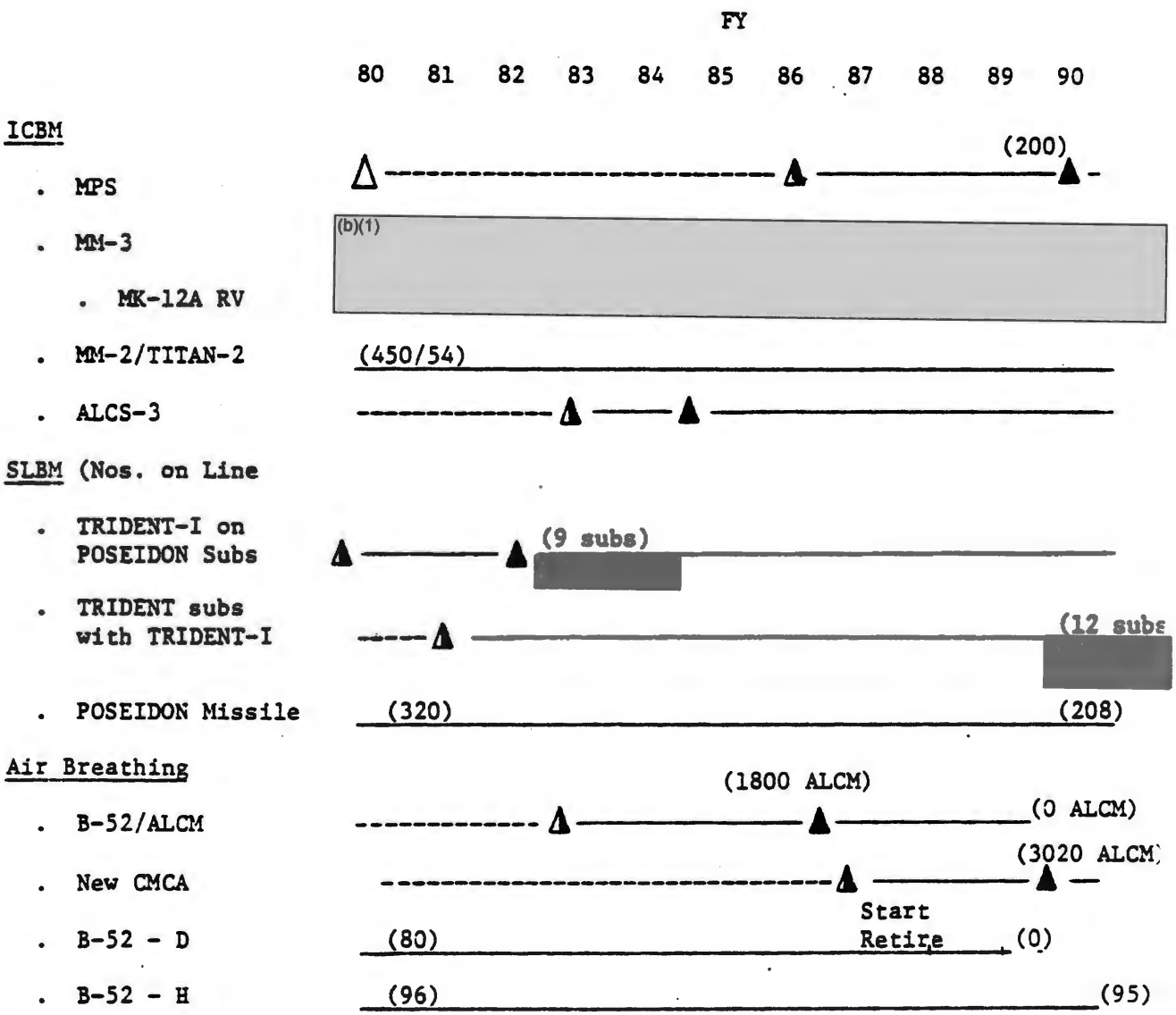
As in Option 1.

o Air Breathing

As in Option 1.

- Summary Schedule - Option 2

△ Start --- R&D ▲ IOC _____ ▲ FOC Operational



Costs (FY 80 $)

Acquisition through FY 1990 - $75B

Life cycle through FY 2000 - $185.5B

Option 3

This option includes ICBM force modernization by deployment of a road mobile MX system (RMMX). The SLBM and Air Breathing forces are kept the same as in Option 1, as is the rest of the ICBM force. The RMMX system is based on existing military bases in the southern half of CONUS during peacetime. It disperses on receipt of strategic warning by dashing out at 25-30 mph on primary and secondary public roads. A (b)(1) day-to-day; the rest of the force requires about 90 minutes to leave the base. From a high level of alert, all could leave the bases within 10 minutes. The system cannot survive a SLBM or ICBM surprise attack, even from a high alert level (on base). Given strategic warning, survivability is as follows:

Strategic Warning Time (hours)	RMMX Survivability
0	0
1 1/2	10%
3	50%
5	85%

Public road limitations preclude a large missile; a 200 klb limit for the transporter-missile combination results in a maximum missile size of about 90 klbs which can carry five Mk-12A size RV's, vice the SALT limit of about 192 klb and ten RV's. Appendix 1 provides more technical detail of the system design, the operating mode, the performance and costs.

Analyses have also been performed on off-road mobile concepts. Such a system would be based on southwestern military bases which have large land areas so that some degree of survivability could be obtained by remaining on the reservations. An off-road system would be more expensive and have poorer survivability than an on-road system because of the technical problems of cross-country operation and the relatively small amount of land available. Several hours after dispersal, the on-road system could be spread over an area of roughly one-half to one million square miles, while the off-road system would still be limited to perhaps one-hundreth of that area. To achieve reasonable survivability then, the off-road carriers would have to be hardened (b)(1), making them extremely heavy and further compounding the problems of off-road operations. For these reasons, off-road mobile has not been included among the options presented here. A more detailed summary of off-road mobile is given in Appendix 2.

A third alternative is a system which combines feature of these two. Namely, a (b)(1) constrained to southwestern military bases but operating on a road (or rail) network designed specifically for it. Such a system would be moved frequently to deny targeting information. There are uncertainties about the usable area available on DoD land and the environmental impact of such a system. The system could be considered as a partial solution capable of allowing survivability of some number of RVs against a limited threat. For example, if 10,000 square miles were available, then it would take about 1500 RVs to barrage the area if the vehicles (b)(1). Appendix 1 has some description of such a system.

Details and schedules are as follows:

(b)(1)

. MINUTEMAN-III reduced one-for-one, per SALT-2. (b)(1) (all Mk-12A) remain in FY 90.

. Minimum changes to the rest of the force, as in Option 1.

o SLBM's

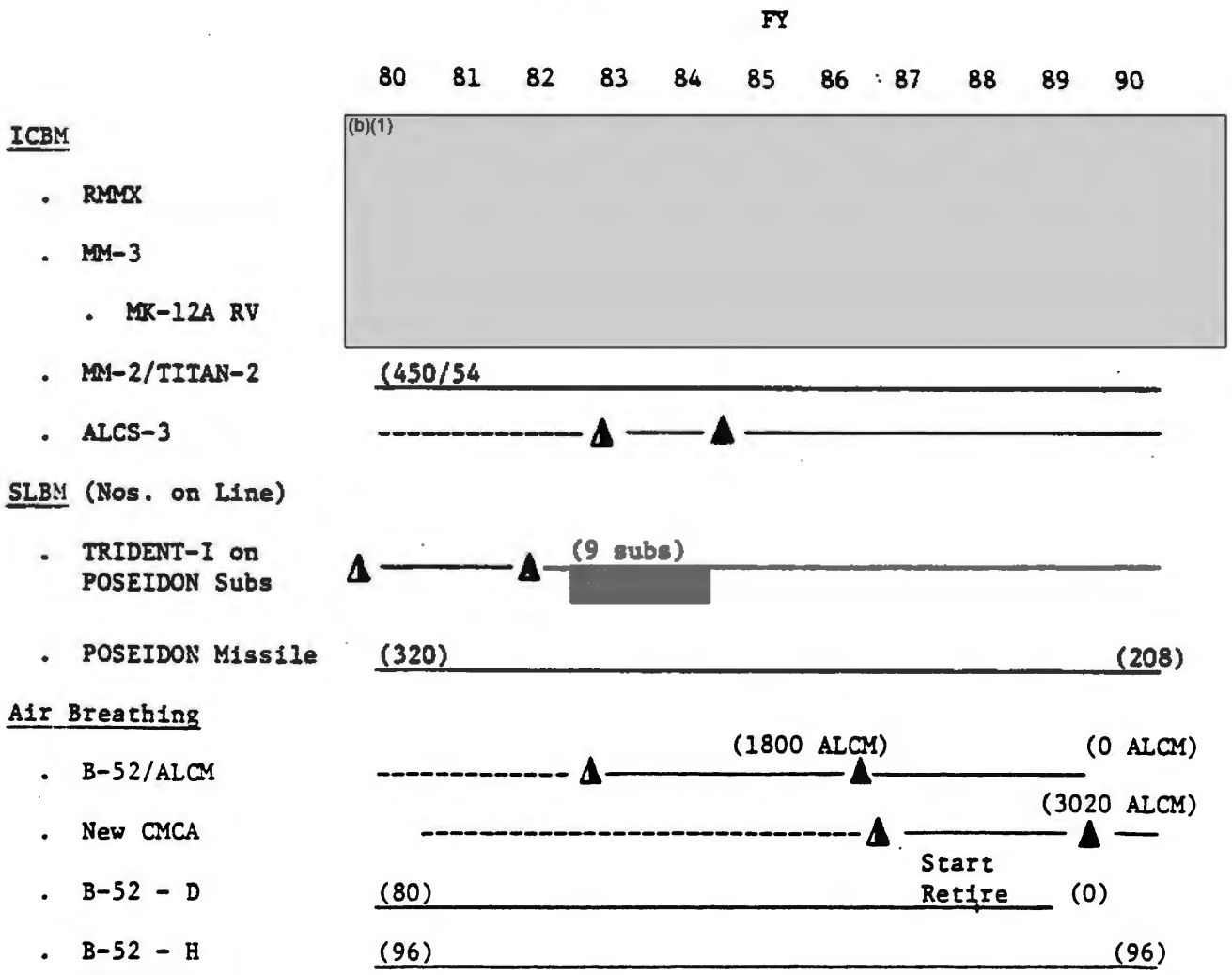
As in Option 1.

o Air Breathing

As in Option 1.

o Summary Schedule - Option 3

△ Start --- R&D ▲ IOC _____ ▲ FOC Operational



Costs (FY 80 $)

Acquisition through FY 1990 - $69.1B

Life cycle through FY 2000 - $179.2B

Option 4

This option includes ICBM force modernization by deployment of some new, large missiles in aircraft (air mobile MX -- AMMX) and some in the existing MINUTEMAN-III silos. (Appendix 4 discusses the air mobile system concepts.) The AMMX aircraft is also used (in modified form) as a cruise missile carrier aircraft and, additionally, leaves a legacy for C^3 aircraft replacement and airlift needs. Several aircraft would be built off one basic core production line, with a degree of commonality so that costs of off-optimum specific uses might be balanced by commonality savings.

The AMMX operating mode involves the following steps. Day-to-day alert is maintained on about 15-20 alert bases in central CONUS. On tactical warning (i.e., the Soviets have launched missiles at us) or on the loss of our key tactical warning sensors and/or associated communications link, the aircraft go airborne. These aircraft can stay airborne waiting for a launch command up to nine hours. If an attack on the U.S. has not taken place by then (but tactical warning is still lost) they can stagger their landing, refuel, and go airborne again maintaining a high percentage of aircraft on airborne alert for some number of days if necessary. If on the other hand an attack has taken place, some (or perhaps all) of the aircraft will receive a launch command. Those that do not receive a launch command will have to land before nine hours, and presumably their original bases will not be available. These remaining aircraft will go to any available airfield and wait for further instructions. Because of the STOL technology incorporated in this aircraft, it can land on runways as short as 2500 feet, of which there are about 2300 in the U.S. This is not enough for the aircraft to get "lost" in the MPS sense, since the Soviets could attack all 2300 airfields. However, these would represent a target of dubious value for them since they would expend more than 2300 RVs to destroy an uncertain number of U.S. ICBMs (from 0 to 70 depending on how many already had been commanded to launch and how many were on airborne alert). On the other hand, we could not count on endurance of this force beyond several days; longer term endurance would come only from our SLBM forces.

The aircraft needed is an extrapolation of an aircraft developed in prototype form for tactical airlift purposes--the Advanced Medium STOL (short-take-off-and-land)--the AMST. It can be extrapolated from the 300 klb class used in the prototyping to the 650 klb class needed for AMMX, and further, can be hardened to nuclear effects so that it has a high probability of escape from SLBM attacks on the bases. A related operating mode is applicable to a cruise missile carrier and to C^3 aircraft, so there is "commonality" or "legacy" of one to the other.

The inclusion of some new, large missiles deployed as replacements for MINUTEMAN III is based on perceptual arguments and potential synergy between AMMX and silo deployment of a large, new missile. In particular,

attack on the AMMX bases by SLBM's could be an additional trigger to the launch-under-attack decision tree associated with our silo-based forces. In this case however, the decision to launch the silo based ICBMs would not be made until after nuclear detonations had occurred on our airbases. A simultaneous launch of SLBMs against the airbases and ICBMs against the silos would result in the SLBMs arriving at the airbases approximately 20 minutes before the arrival of ICBMs at our silos. Thus the Soviet war planner would either have to let all of our airborne systems (ICBMs, cruise missiles and bombers) escape without a base attack, or take the risk of our launching our silo-based missiles in the 20 minutes after nuclear detonations at the airbases but before the ICBMs had arrived at the silos. To avoid this problem, he could launch SLBMs to attack the airbases and to "pindown" the missiles in silos until his ICBMs arrive. This could be an effective tactic against the Minuteman missiles, but the MX missile would have a greatly improved capability of flying out through a nuclear attack so that this pindown tactic would not be effective.

The missile is a ten RV, 150 klb design optimized for air launch. It would be less capable for silo launch, 9 or 10 RV's depending upon range-to-target. It could have a small degree of commonality with a TRIDENT-II design. High accuracy is achieved from air launch by use of ground-based beacons providing GPS equivalent position and velocity data; CEP of [redacted] seems achievable. The missile would be nuclear hardened to mitigate the threat of pindown.

(b)(1),(b)(3):42 USC §2168(a) (1)(C)--(FRD)

The AMMX aircraft modified to carry cruise missiles instead of an ICBM becomes the CMCA in this option. It can be made tanker independent and while not optimum for such a mission (it is more expensive), the legacy to the various applications cited above could justify its general use as described.

The SLBM force in this option is the same as in Option 1. The specifics of Option 4 and the schedule are outlined below.

o ICBM's

- 70 alert AMMX with 10 RV, 150 klb missile
- 100 new missiles in existing MINUTEMAN silos
- 161 total aircraft, of which 103 are SALT accountable (training aircraft have different configurations, so FRODS exist).
- About 2300 secondary dispersal airfields with uncertain length of sustained capability post-attack.

- . AMMX and MX in silos reduce MM-III deployment to 235 by FY 90 to comply with SALT-2.
- . The rest of the ICBM force is as described in Option 1.
- . AMMX aircraft is a 650 klb hardened extrapolation of the AMST technology. It has an airborne endurance of up to, perhaps 9 hours.

o SLBM's

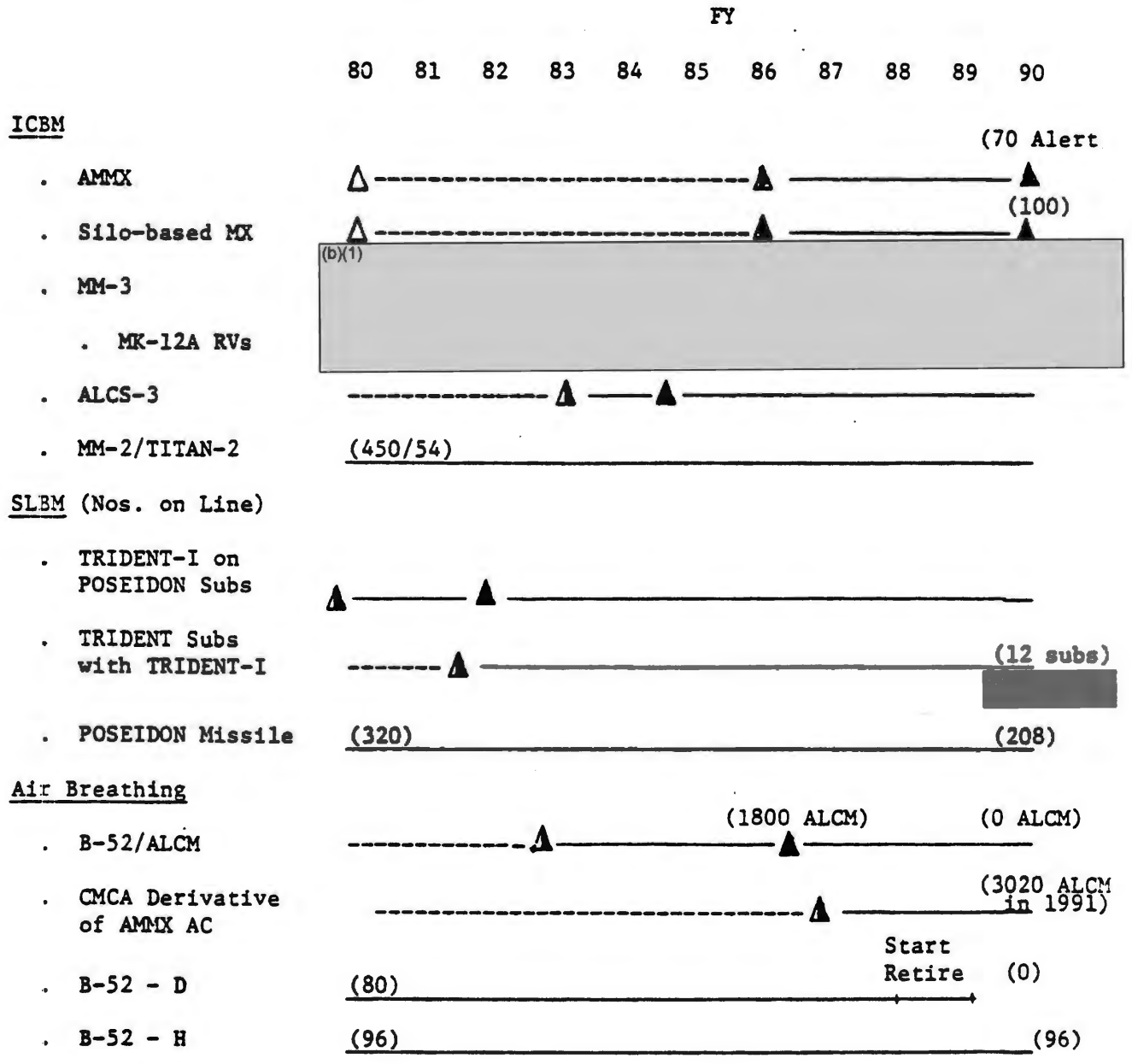
As in Option 1.

o Air Breathing

- . A derivative of the AMMX aircraft is used for the CMCA and CMCA's are deployed slower than in other options due to the production of AMMX aircraft at the same time. CMCA FOC occurs in 1991. Tanker independence is achieved by on-loading additional fuel to an extent that the CMCA loses STOL capability; a runway of about 7000 ft is needed for a fully loaded CMCA (above 700klbs).
- . Other items as in Option 1.

o Summary Schedule - Option 4

△ Start --- R&D ▲ IOC _____ ▲ FOC Operational



Costs (FY 80 $)

Acquisition through FY 1990 - $77.3B

Life cycle through FY 2000 - $188.2B

Option 5

Option 5 puts an increased emphasis on the SLBM and air breathing forces. It increases the number of cruise missiles (from about 3,000 to 5,000) and CMCA (from 100 to 200). It also develops a common missile (Trident-II) which is deployed on all Trident submarines and in 400 Minuteman silos.

(b)(1),(b)(3):42 USC §2168(a) (1)(C)–(FRD)

This program preserves the option for deploying the common missile in a mobile configuration, either road mobile or air mobile, at a later date. Some portion of the 400 missiles allocated to Minuteman silos could instead be placed in a mobile configuration to further complicate the task of a Soviet war planner or to deal with growths of the Soviet threat greater than now anticipated.

Details and schedules are outlined below.

- o ICBM's
  - . 400 silo-based common missiles, FY 87 IOC
    (b)(1)
  - . Minuteman III is phased out completely in accordance with SALT-2 limits on MIRVs
  - . Other ICBM forces as described in Option 1.
- o SLBM's
  - . TRIDENT-I missile deployed on 12 Poseidon subs by 1982.
  - . TRIDENT-II missile initially deployed on TRIDENT submarine in FY 87; nine TRIDENT subs are fitted with TRIDENT-II missiles by 1990. A total of 25, the FOC, are equipped by 1998.
  - . (b)(1)

o Air Breathi.

- ALCM deployed externally on B-52G's starting in FY 83 with FOC in FY 86.
  - New CMCA replaces the B-52G with an IOC in FY 87; 4600 ALCMs are deployed with an FOC in FY 89.
  - CMCA R&D starts in FY 80.
  - CMCA is a hard, fast aircraft and is tanker independent (28 ALCMs to 6000 nm).
  - Total active inventory of the new CMCA is 182; 164 are on-line with a (b)(1) percent alert rate.
- B-52G's replaced by the new CMCA are "de-frodded" and retained as penetrators. B-52D's are retired accordingly. B-52H force is unmodified.
- Tankers transferred or retired from strategic inventory when CMCA replaces B-52G's and B-52D's are retired.

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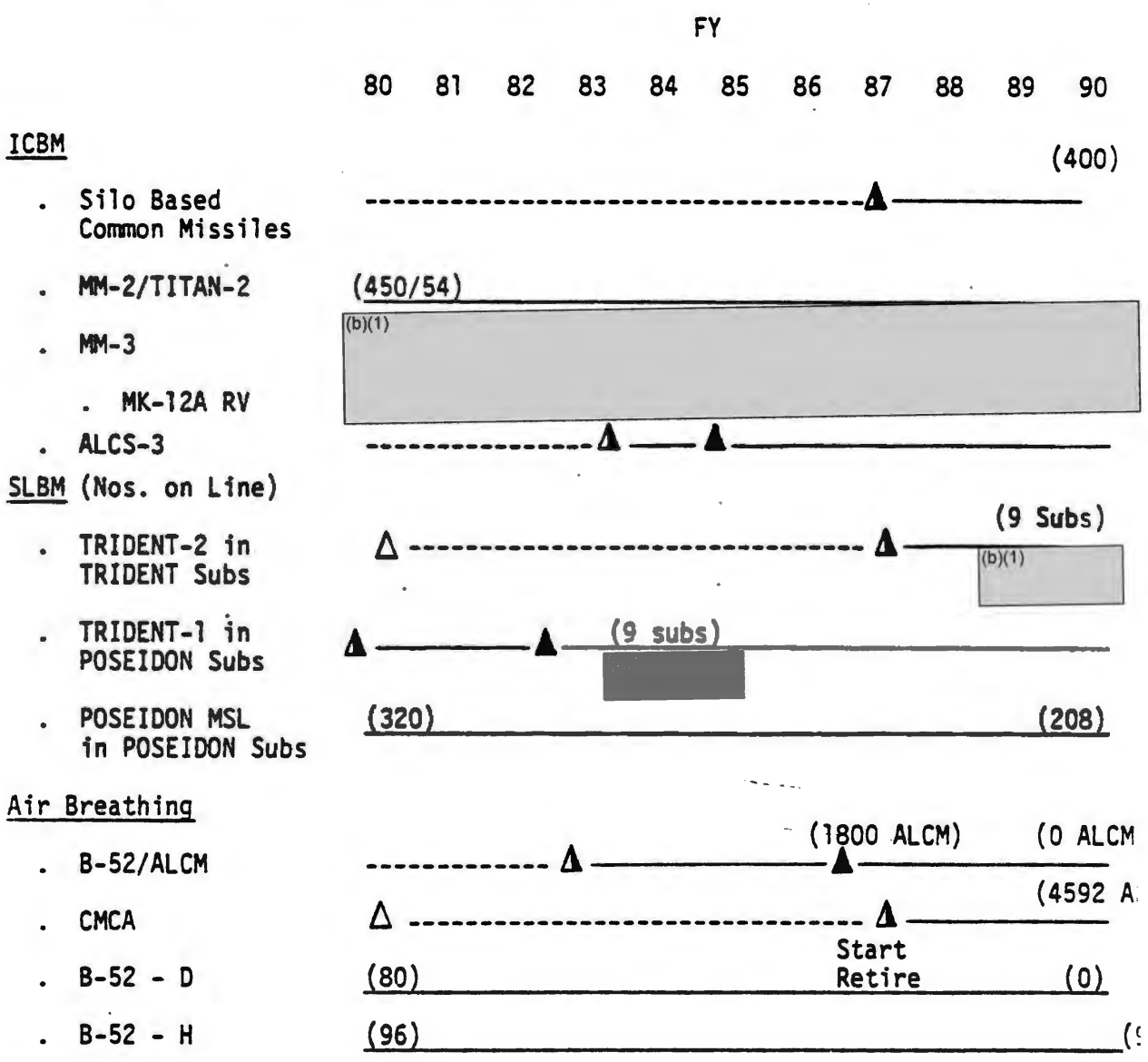
o Summary Schedule - Option 5

Δ Start --- Development ▲ IOC ▲ FOC Operational



Cost (FY 80 $)

Acquisition through FY 1990 - $74.7B

Life cycle through FY 2000 - $189B

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3. Cost/Effectiveness Comparison

The cost and effectiveness of the options are compared in this section. Figures 1 and 2 present surviving EMT and warheads, respectively, for each option as a function of time for both day-to-day and generated alert scenarios.* The figures show:

- There are essentially no differences between the options until about 1986 when the first deployments of the modernized systems would be realized.

- Option 5 provides substantially more capability in terms of surviving EMT and warheads for all scenarios, largely due to the high PLS of Trident. The common missile in Option 5 (b)(1) The Trident force is the only one to continue to grow after 1990 because the other forces reach FOC by 1990 while Trident, at the assumed 1-2-1-2 deployment rate, does not reach FOC until 1998.

- All options, with the exception of road mobile MX in day-to-day alert, provide increased capability over the minimum-modernization force (Option 1). The road mobile MX system is assumed to have zero PLS against a bolt-out-of-the-blue attack.

- All options provide greater capability than today's forces.

- All options show a decrease in warheads after 1990 as a result of Poseidon retirement.

Table I presents year-by-year costs through 1990 and total life cycle costs through the year 2000 for each of the options. These are the direct costs, in 1980 $, of procuring and operating U.S. strategic forces; they do not include indirect costs, such as those associated with C^3 and intelligence, nor do they include the costs for defensive systems and RDT&E for follow-on programs. For reference, comparable costs for the current FYDP are shown.

Although no attempt was made to smooth out the cost streams shown in Table I for each of the options, each program is sure to have some bulge in the mid-1980s as RDT&E ends and procurement begins for each of the modernized systems reaching IOC in 1986/87. The extent of the bulge obviously is a function of the number of new systems and the assumed pace of the programs. All options in this analysis used roughly the same building rates for all aircraft and missiles.

*The threat used in this analysis was based on the 1978 NIE and the Air Force DSARC IIB threat to AMMX. It was assumed that this threat remains constant from the late 1980s through the year 2000.

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Figure 1

SURVIVING EQUIVALENT MEGATONS

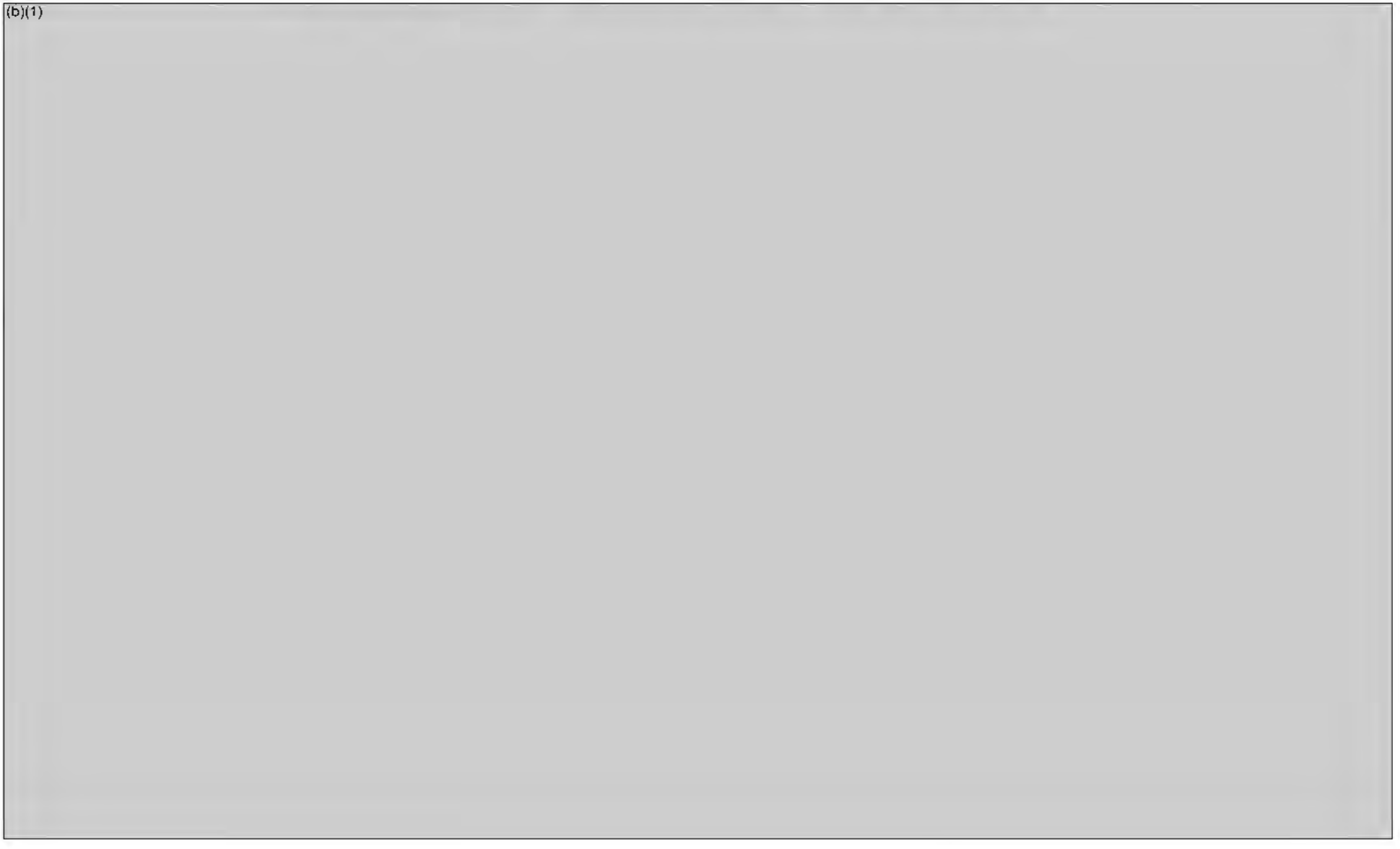

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Figure 2

SURVIVING WARHEADS

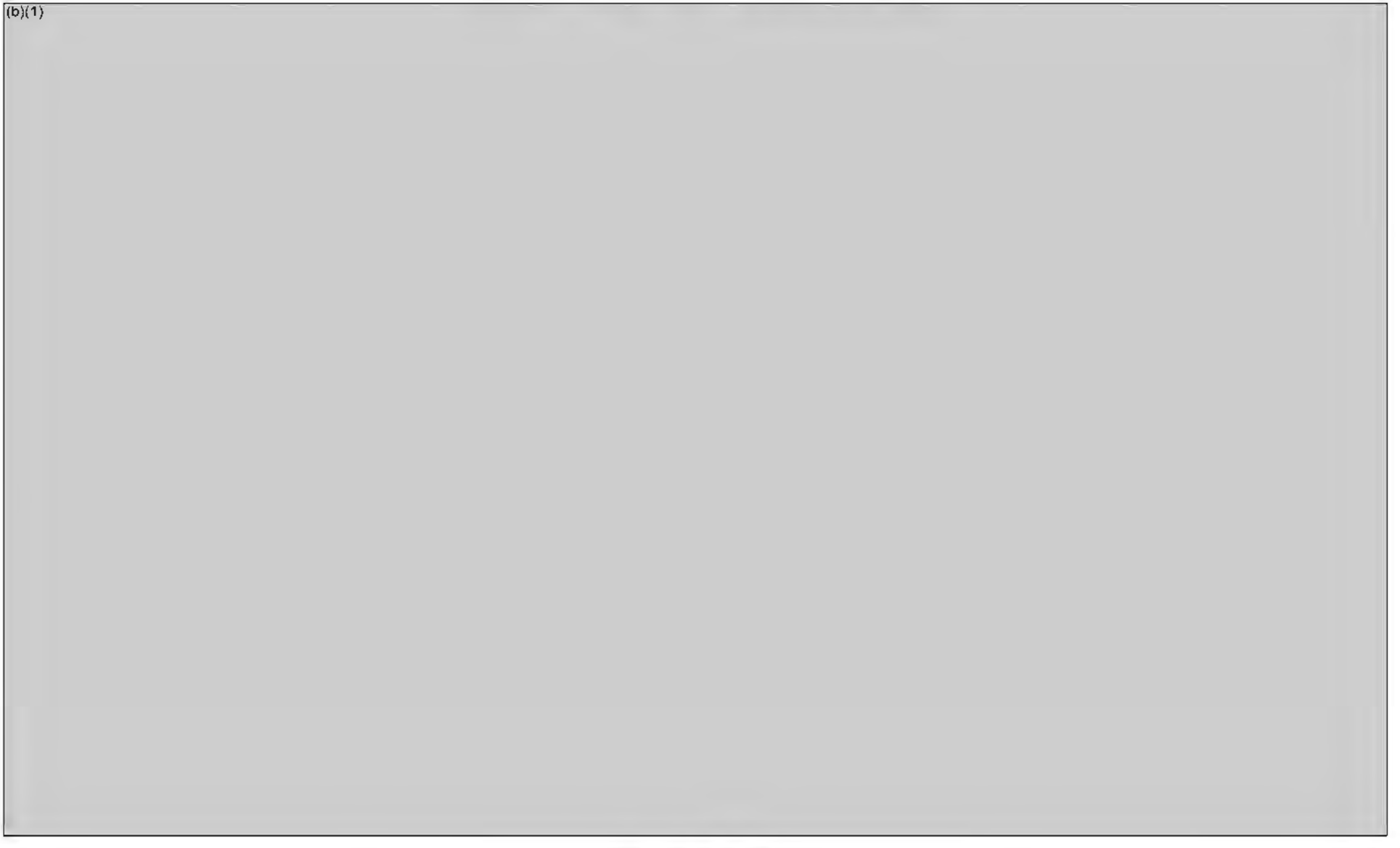

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Table I

COST SUMMARY

(FY 80 $ BILLION)

Option	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	91-2000	Total
1	8.1	8.1	8.5	8.2	10.2	10.6	12.1	8.7	8.7	6.8	8.6	55.0	153.6
2	8.9	9.3	10.2	11.5	15.1	15.3	16.3	11.9	10.9	7.4	9.1	59.5	185.5
3	8.8	9.3	9.9	10.0	13.8	14.1	15.5	11.8	10.9	7.4	9.0	58.7	179.2
4	9.0	9.4	10.5	13.8	16.0	14.4	15.4	13.2	10.2	7.9	9.2	59.2	188.2
5	8.3	9.4	10.6	11.6	14.6	13.0	16.6	11.3	11.7	8.3	9.9	64.8	190.1
FYDP	8.7	9.2	10.2	11.9	14.4								

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Table I shows:

- As in the PD-18 study on ICBM modernization, the minimum-modernization force is $25-35B cheaper than the rest of the options, but this force provides a poor essential equivalence picture (as is discussed in the next section).

- Options 2-5 cost within a few percent of each other--well within the accuracy of the calculations.*

The cost and effectiveness data is brought together in Tables II and III. Table II shows the average additional cost (relative to Option 1, which serves as the reference point in Tables II and III) for each additional surviving or enduring EMT (again, relative to Option 1). The additional cost is shown in the table both in terms of acquisition cost through 1990 and total life cycle cost through the year 2000. The numbers shown across the table for Option 1 are the baseline values from which the delta cost and effectiveness are measured. For example, Table II shows that Option 2 costs $25.5B more than Option 1 in terms of acquisition cost through 1990 (i.e., it costs a total of $75B), and each additional surviving EMT on day-to-day alert (i.e., above 1441) costs an average of $54.8M. Table III shows the same data for warheads.

The tables show the following:

- Option 5 is the most cost-effective option in almost every case.

- The road mobile MX is competitive with MPS given sufficient strategic warning (generated alert).

- The AMMX Option (4) is cost-ineffective.

*We have less confidence in the costs associated with the road mobile MX than the other systems presented. Of particular concern is an apparent shortfall in manpower needed for security of this system when dispersed in times of crisis.

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Table II

COST/EFFECTIVENESS SUMMARY 1/ - EMT

	Δ Acquisition Cost Thru 1990 (1980 $ B)	Δ Program Cost Thru 2000 (1980 $ B)	Δ Acquisition Cost/ Δ Surv EMT in 1990 (1980 $ M) D/D Alert	Δ Acquisition Cost/ Δ Surv EMT in 1990 (1980 $ M) Generated	Δ Acquisition Cost/ Δ Enduring EMT in 1990 (1980 $ M) D/D Alert	Δ Acquisition Cost/ Δ Enduring EMT in 1990 (1980 $ M) Generated	Δ Program Cost/ Δ Surv EMT in 2000 (1980 $ M) D/D Alert	Δ Program Cost/ Δ Surv EMT in 2000 (1980 $ M) Generated	Δ Program Cost/ Δ Enduring EMT in 2000 (1980 $ M) D/D Alert	Δ Program Cost/ Δ Enduring EMT in 2000 (1980 $ M) Generated
Option 1 Min-Mod ICBM-MM III SLBM-Trident I Bomber-SWL-1	(49.5)	(153.6)	(b)(1)							
Option 2 MX in MPS (200 UE)	25.5	31.9								
Option 3 Road Mobile MX (232 UE)	19.6	25.6 4/								
Option 4 AMMX (70 Alert A/C) MX in Silos (100)	27.8	34.6								
Option 5 Trident II CMCA (+100 A/C) D-5 in Silos (400)	25.4 3/	36.5								

1/ (b)(1)

2/ Road mobile assumed to have zero PLS in bolt-out-of-the-blue attack (b)(1)

(b)(1)

3/ Includes procurement of SSBNs and Trident II not available until post-1990.

4/ Based on Air Force estimates. (b)(1)

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Table III

COST/EFFECTIVENESS SUMMARY[1]/ - WARHEADS

	Δ Acquisition Cost Thru 1990 (1980 $ B)	Δ Program Cost Thru 2000 (1980 $ B)	Δ Acquisition Cost/ Δ Surv W/H in 1990 (1980 $ M) D/D Alert	Δ Acquisition Cost/ Δ Surv W/H in 1990 (1980 $ M) Generated	Δ Acquisition Cost/ ΔEnduring W/H in 1990 (1980 $ M) D/D Alert	Δ Acquisition Cost/ ΔEnduring W/H in 1990 (1980 $ M) Generated	Δ Program Cost/ Δ Surv W/H in 2000 (1980 $ M) D/D Alert	Δ Program Cost/ Δ Surv W/H in 2000 (1980 $ M) Generated	Δ Program Cost/ ΔEnduring W/H in 2 (1980 $ D/D Alert	Δ Program Cost/ ΔEnduring W/H in 2 (1980 $ Generated
Option 1 Min-Mod ICBM-MM III SLBM-Trident I Bomber-SWL-1	(49.5)	(153.6)	(b)(1)							
Option 2 MX in MPS (200 UE)	25.5	31.9								
Option 3 Road Mobile MX (232 UE)	19.6	25.6 4/								
Option 4 AMMX (70 Alert A/C) MX in Silos (100)	27.8	34.6								
Option 5 Trident II CMCA (+100 A/C) D-5 in Silos (400)	25.4 3/	36.5								

1/ (b)(1)

2/ Road mobile assumed to have zero PLS in bolt-out-of-the-blue attack.

3/ Includes procurement of SSBNs and Trident II not available until post-1990. (b)(1)

4/ Based on Air Force estimates. (b)(1)

4. Comparisons of Options

The force modernization options are implicitly compared here by arraying the pros, cons and counter-cons germane to each of them. A tabular format is used to allow side-by-side viewing of these three categories of judgments. Both technical and nontechnical considerations are noted.

Appendix 6 is included in order to provide more detail on matters pertinent to the MPS system since these matters have been the focal points for various pro-con MPS discussions. Specifically treated there are verification, breakout, threat bounding and arms control compatibility.

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OPTION 1

(MINIMUM MODERNIZATION)

PRO	CON	COUNTER-CON
1. Lowest cost option 2. Forces more capable than today's . More warheads and EMT . New CMCA . New SSBN's, SLBM's	1. Poor Essential Equivalence Posture . Particularly in indices based on force-exchange estimates.	
	2. Inert program, relative to Soviets . High cost in perceptions	
	3. Abandons survivable ICBM's because of Soviet strength	. Capability, not labels, counts
	4. Provides no significant leverage to achieve large reductions in SALT-3	. Absence of U.S. ICBM modernization program sets stage to ask Soviets to reciprocate
	5. Vulnerable U.S. ICBM force may be de-stabilizing	
	6. No survivable quick reaction hard target kill capability . Hard target kill depends on ALCM's	. Unambiguous (non-silo) hard targets needing quick attack may be few in number

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OPTION 2

(200 MX IN MPS)

PRO	CON	COUNTER-CON
1. Preserves ICBM force characteristics . Independent of warning . Secure C^3 . Endurance . Quick reaction and responsiveness (including hard target kill) . Flexible use . Low operating costs	1. A Soviet MPS allows infra-structure that may facilitate Soviet SALT breakout	. Absence of control/limits on missile · duc· tion, storage, disposition (retired m ile: allows covert breakout preparations indepen· dent of MPS . ICBM can be launched without shelters/silos . No apparent Soviet motivation/interest for MPS . They've preferred truck-mobile (SS-16/20)
2. Excellent Essential Equivalence posture	2. May not be possible to bound the threat to MPS	. MPS resilience . Factor of 2 threat increase still leaves about 15% survivors . Cheaper for us to expand MPS than for Soviets to deploy larger threat (and the large-scale threat increases that could be harmful take time--so we would notice it a react) . BMD overlay provides very large leverage f U.S. (compounds basic MPS leverage factor)
3. Cost-effective		
4. Inherent ICBM survivability obviates counterforce utility of Soviet ICBM force . High exchange ratio favorable to U.S. . Provides countervailing strategy		
5. Less sensitive to qualitative improve-ments in Soviet strategic forces (e.g., accuracy)	3. Potentially vulnerable to security breakdown	. No master list of missile locations . At most, only one missile location kno to crew . Multiple shuffles per main move-cycle deni crew knowledge of whether it did final move . Must compromise large number of people to compromise the force
6. High survivability allows future SALT reductions		
7. Robust force provides SALT leverage		
8. Strong support within DoD	4. Potentially vulnerable to new methods to determine missile position	. U.S. Red/Blue Team activities can stay ahead of possible Soviet efforts . We'd discover problems early and first-hand . Procedures and techniques could be changed accordingly

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OPTION 2 (Cont'd)

PRO	CON	COUNTER-CON
	5. May be difficult to verify a Soviet MPS	. Methods available as long as both sides cooperate in the sense of SALT-2 . Can make MPS and SSBN/SLBM verificati... analogous in concept
	6. MPS has environmental problems	. Deployment a la MINUTEMAN in isolated 2-3 acre sites only removes about 25 sq miles fro public use. Supporting road network generall available for public use. . Uses land of limited value for other purposes (western deserts). . Positive reaction from western states.

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OPTION 3

(232 SMALL MX, ROAD MOBILE)

PRO	CON	COUNTER-CON
1. Low acquisition costs for an option which includes ICBM modernization . Smallest investment required to achieve ICBM survivors	1. ICBM force depends critically on strategic warning for survivability . Negligible survivability until about 1.5 hours after dispersal	
2. High survivability and effectiveness in the generated alert posture	2. Generation of ICBM force may be destabilizing in times of crisis	
3. ICBM force insensitive to threat level after dispersal	3. Road Mobile ICBM may be difficult to verify	. Methods available as long as both sides cooperate in the sense of SALT-2 . Draw analogy with SSBN/SLBM
4. Preserves many of the traditional ICBM force characteristics . Secure C^3 . Endurance (days) . Quick reaction and responsiveness (including hard target kill) . Flexibility in use	4. Major public interface problems with Road Mobile ICBM . Precludes missiles on dispersal during peacetime . May inhibit realistic training	
	5. Cannot employ SALT permitted maximum size missile . Constrained to 5 RV missile weighing 90 klbs	
	6. Road Mobile ICBM system is manpower intensive	

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OPTION 5

(TRIDENT II PLUS 100 ADDITIONAL CRUISE MISSILE CARRIER AIRCRAFT PLUS 400 COMMON MISSILES IN SILOS)

PRO	CON	COUNTER-CON
1. T-II portion preserves some equivalent ICBM force characteristics . Independent of warning . Endurance . Quick reaction and responsiveness (including hard target kill)	1. C^3 currently difficult for submarines to be used for time-urgent mission	. C^3 to subs can be improved to support all modernization efforts
2. CMCA provides hard target kill capability	2. Silo basing of new ICBM does not, by itself, solve the ICBM vulnerability problem . Survivability depends on launching during an attack . May produce crisis instability	. Unless the Soviets are willing to forego attack on the air breathing forces we will have time after nuclear detonation on the air-bases to decide to launch ICBM's
3. Good cost-effectiveness	3. Missile commonality delay IOC by one year (to 1987)	. We may be able to work around delay in program definition phase
4. Relatively immune to Soviet breakout. Immune to improved Soviet accuracy	4. ICBM is smaller than SALT-permitted size	
5. Relatively cheap way of tripling the number of ICBM warheads . Perceptual values . Hardened warhead defeats pindown tactic		

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OPTION 4

(70 ALERT AIR MOBILE MX, PLUS 100 MX IN SILOS)

PRO	CON	COUNTER-CON
1. Preserves some ICBM force characteristics . Secure C^3 . Some Endurance (hours) . Quick reaction and responsiveness (including hard target kill) . Flexible use	1. Expensive--substantial investment in aircraft required before any surviving force level is achieved . Low-cost effectiveness	. Lack of verification and breakout concerns may be worth some price in order to have a survivable ICBM force
	2. Air mobile survivability depends on tactical warning	. Tactical warning is adequate when operating. If it malfunctions or is attacked, then Air Mobile will scramble to airborne alert.
2. Aircraft may provide legacy for other uses 3. Verification of Air Mobile ICBM not likely to be contested	3. Silo basing of new ICBM does not, by itself, solve the ICBM vulnerability problem . Survivability depends on launching during an attack . May produce crisis instability	. Unless the Soviets are willing to forego attack on the air breathing forces we will have time after nuclear detonation on the air bases to decide to launch
4. If Soviets adopt Air Mobile ICBM's potential breakout problem is similar to that of bomber forces . U.S. and Soviets already are conditioned to accept this situation	4. Legacy of aircraft is of uncertain value, relative to unique aircraft . Cruise missile carrier not optimum design - may require tankers . C^3 aircraft not well-defined	. But indications are that aircraft derivatives are adequate for the missions
5. Insensitive to Soviet accuracy improvements	5. Environmental and public interface problems of dispersing aircraft with nuclear weapons on many bases (making targets out of areas that would not necessarily be so).	. Can restrict operations to only military bases in peacetime (at some cost). Public bases need only be used in times of crisis or in wartime.
	6. Air Mobile ICBM is manpower intensive	
	7. Limited endurance for ICBM force	

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5. Observations

The principal observations that can be drawn from a review of the various options are as follows:

- Option 2 and 5 are the most cost-effective.
- Option 4 is the least cost-effective because of the high cost of the aircraft to carry the missiles.
- Option 2 has the highest perceptual value.
  - It faces the threat to our ICBM's by improving their survivability and in a manner that preserves the strategic TRIAD structure.
  - It allows use of the largest missile allowed by SALT.
- Option 1 has the least perceptual value and does not provide a good essential equivalence picture.
- Option 2 and 3 may have potential verification and breakout problems.
- Option 3 has a potentially destabilizing influence because of its critical dependence on strategic warning.
- Options 4 and 5 are dependent on tactical warning for ICBM survivability (base escape of the aircraft and LUA execution of the silo-based force).
- Option 5 has problems of not making the ICBMs, by themselves, survivable and of having less payload in the ICBM than SALT II allows.

Both options 2 and 5 cost about $25 billion (through FY 90) more than the minimum modernization program (Option 1); both fall within FYDP funding; and both offer substantial increase in strategic force capabilities. Option 2, by putting a substantial investment in ICBM basing, achieves the best technical solution of the ICBM survivability problem. Option 5, by putting a substantial investment in strengthening the cruise missile and SLBM forces, achieves the most cost-effective solution over the forces, but its ICBM survivability is achieved synergistically by cross force dependence. (Option 5 does however preserve the option of redeploying some portion of its silo-based missiles in a mobile configuration.) In both options there are significant nontechnical and nonmilitary issues (e.g., political perceptions, environmental, SALT verifiability). These issues should provide the principal basis for distinguishing between Option 2 and Option 5.

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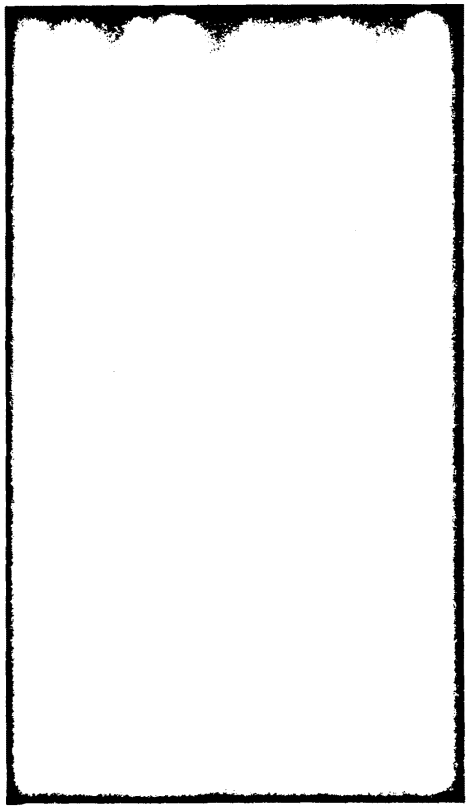
M-X



AGENDA

- REQUIREMENT
- PROGRAM EVOLUTION
- MPS
- AIR MOBILE
- COST COMPARISON
- CONSIDERATIONS
  - WARNING
  - BOUNDING THE THREAT
  - VERIFICATION
  - BREAKOUT
  - ARMS CONTROL COMPATIBILITY

DESIRED CHARACTERISTICS OF LAND BASED ICBMs

- SURVIVABILITY
- INDEPENDENCE FROM WARNING
- NOT VULNERABLE TO SAME ATTACK MODE AS OTHER TRIAD LEGS
- ENDURING USEFULNESS
- FLEXIBILITY OR WARFIGHTING
- LOW OPERATING AND SUPPORT COSTS

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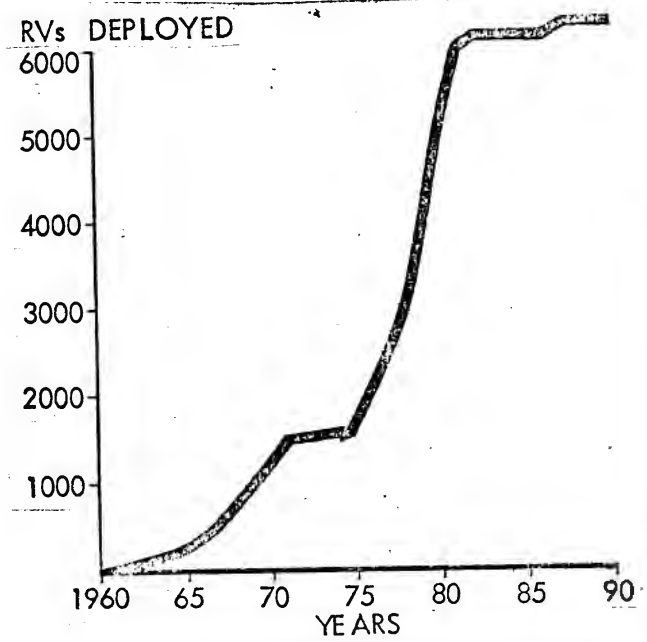
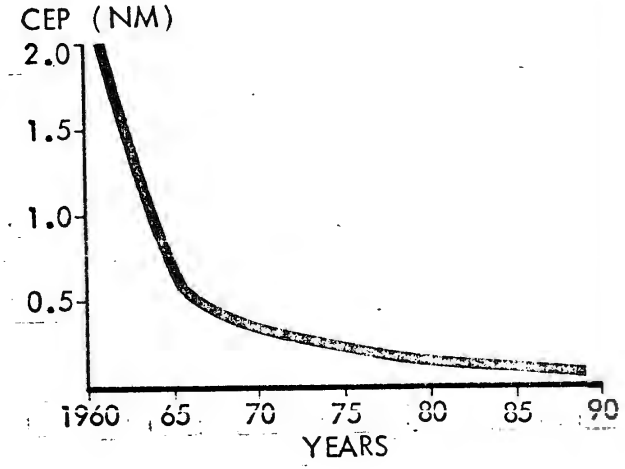
SILO SURVIVABILITY

SOVIET ICBM RV DEPLOYMENT



SOVIET ICBM ACCURACY TRENDS



US ICBM SURVIVABILITY COMPARISON
LAST YEAR's VS. CURRENT ESTIMATE

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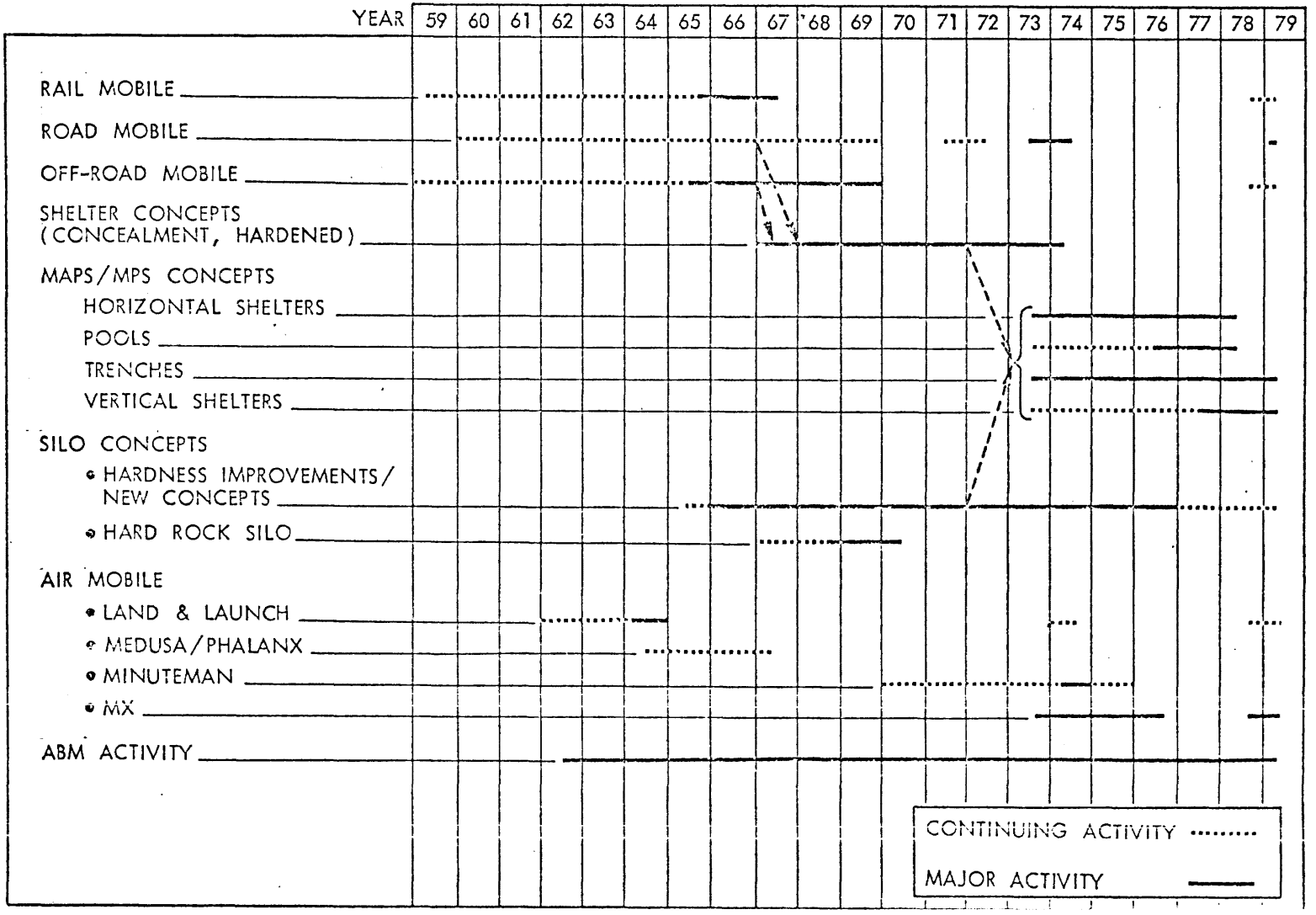
ICBM BASING STUDY ACTIVITY

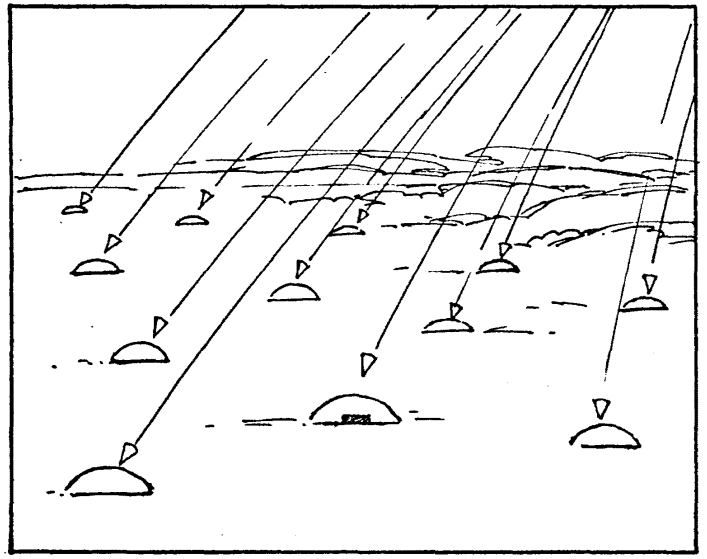


MX PROGRAM EVOLUTION

NOV 71	SAC REQUIREMENT
MAY 74	ADVANCED DEVELOPMENT
74 - 76	BASING MODES EXPLORED • MAP • AIR MOBILE • GROUND MOBILE LARGE MISSILE EVOLVED
MAR 76	DSARC I • EMPHASIS ON TRENCH • LARGE MISSILE
76 - 78	FURTHER BASING STUDIES • VERTICAL SHELTER • MORE RESILIENT • LOWER COST • LESS LAND WITHDRAWN
DEC 78	DSARC IIA
MAR 79	DSARC IIB

MULTIPLE PROTECTIVE STRUCTURES

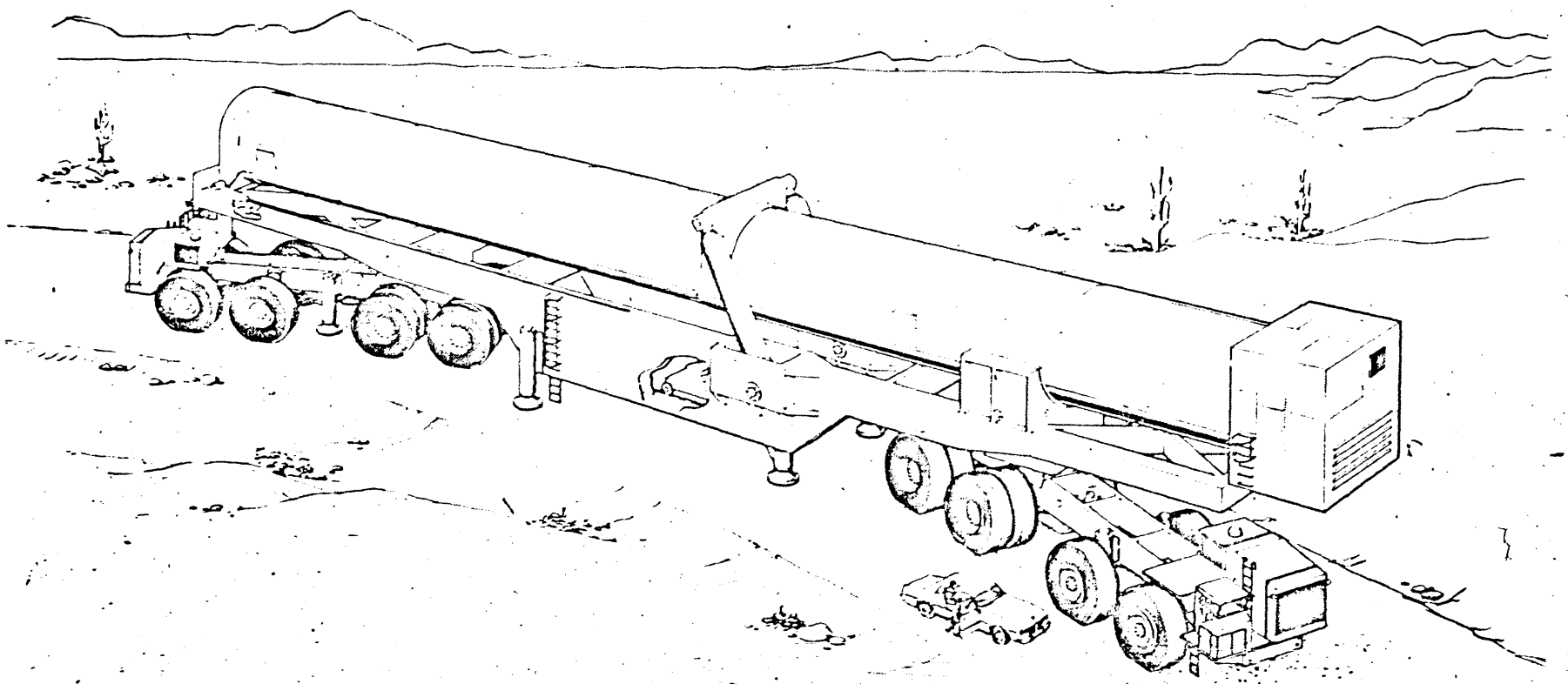
MULTIPLE PROTECTIVE STRUCTURES

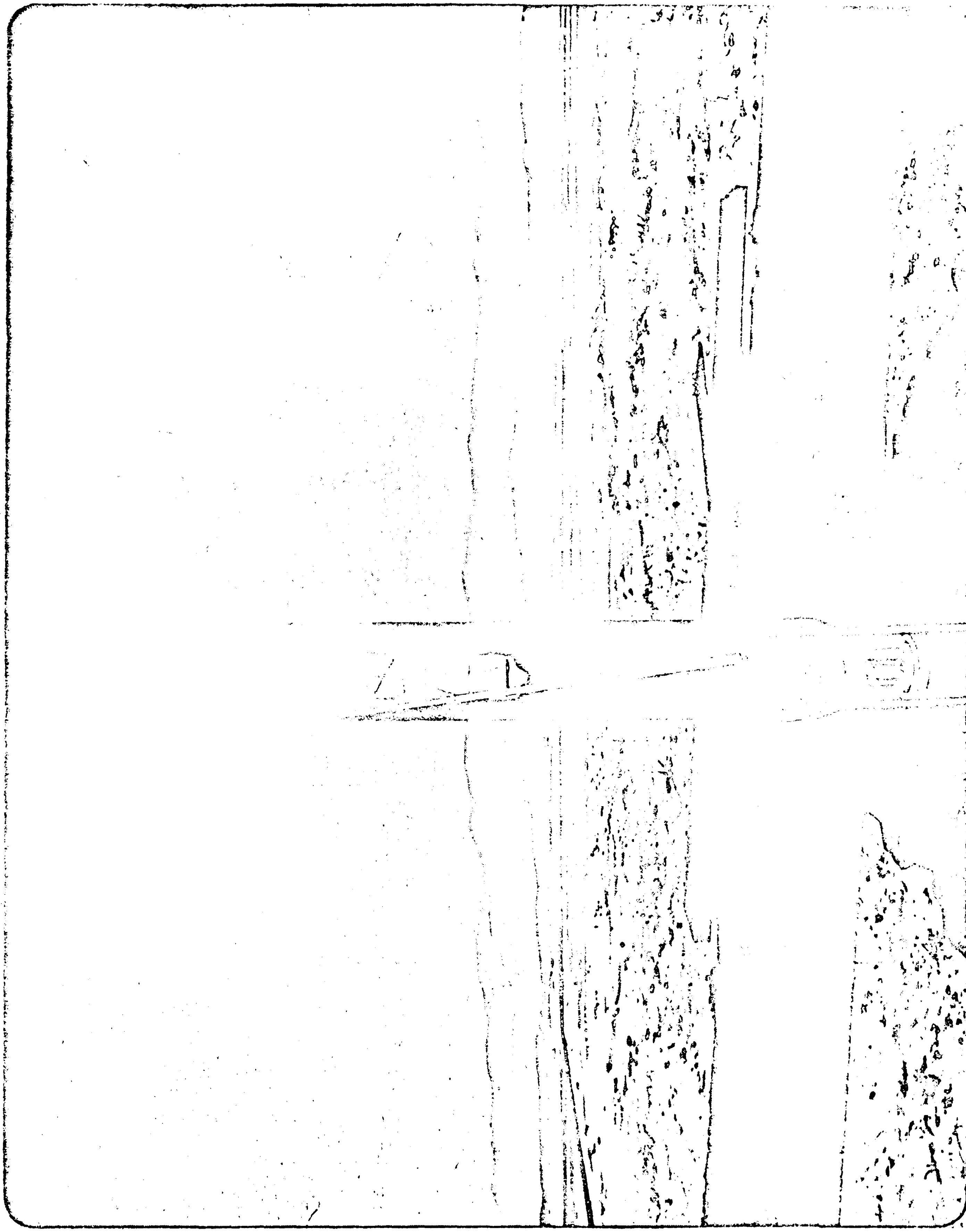


SHELTER

- CREATE ARTIFICIAL TARGET STRUCTURE
- REDUCES SOVIET FIRST STRIKE INCENTIVE

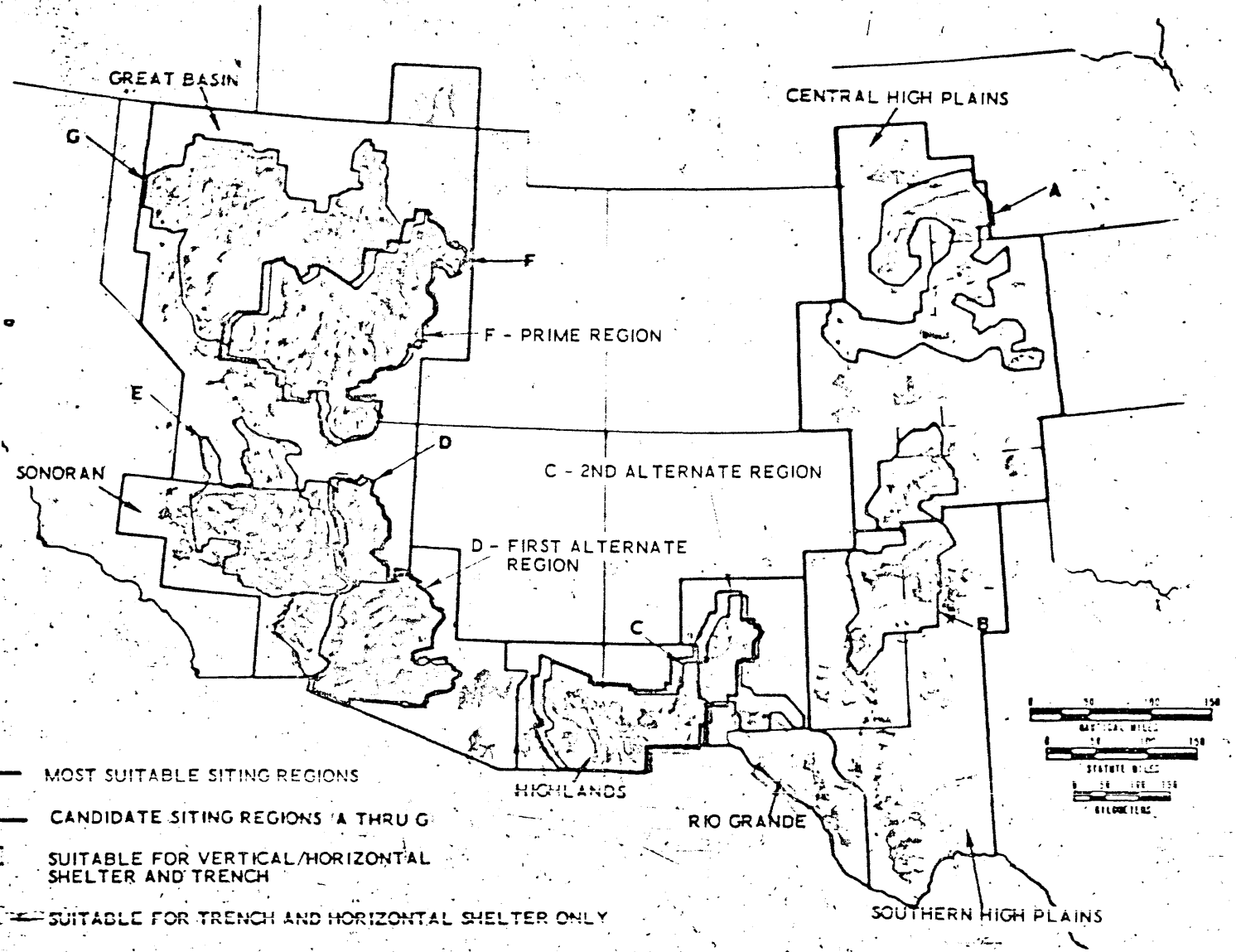
MX Transporter-Emplacer Vehicle Concept





UNCLASSIFIED

Vertical Shelter Fine Screening Results



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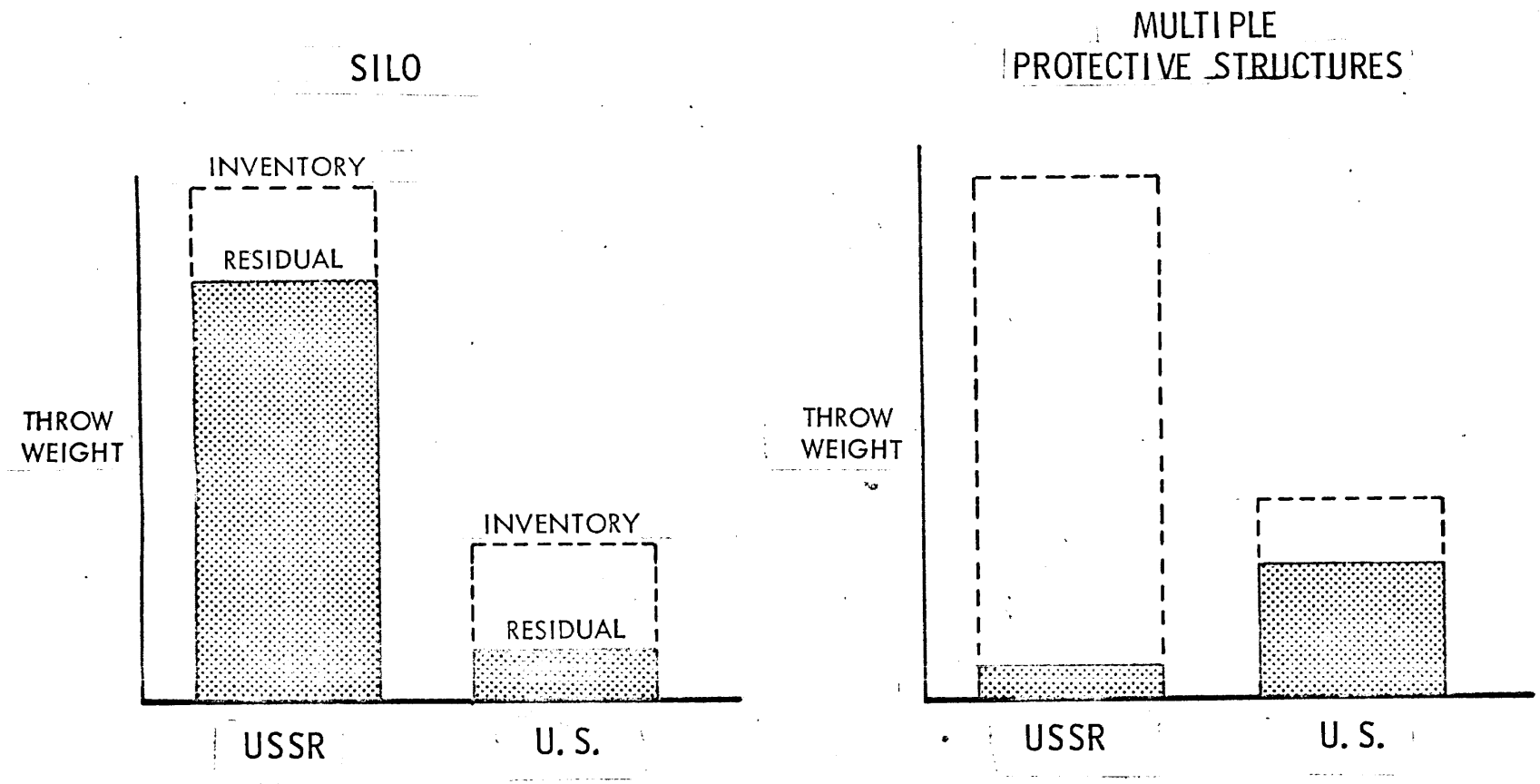
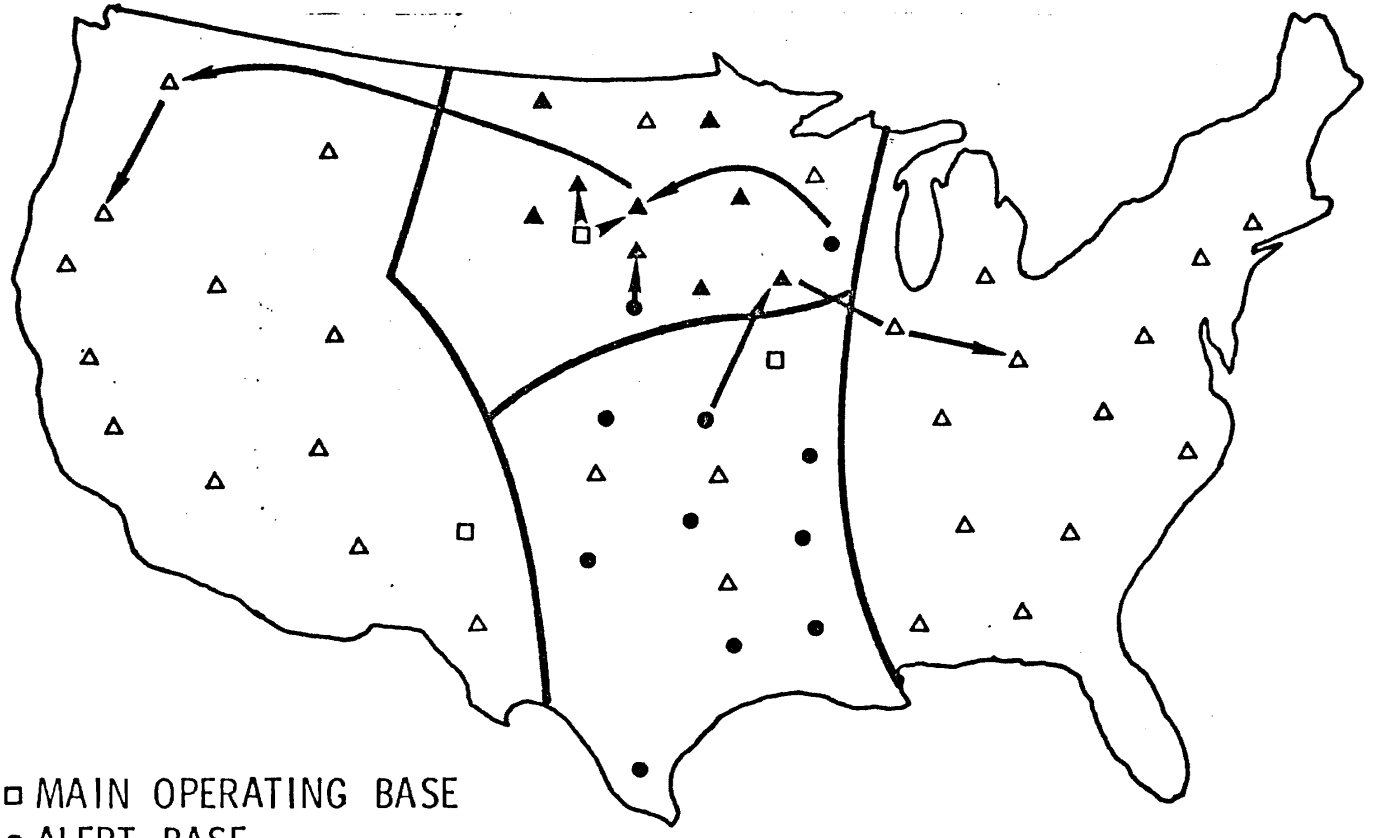
THROWWEIGHT EXCHANGE
SOVIET FIRST STRIKE



CE

AIR MOBILE M-X

MX AIR MOBILE CONCEPT



□ MAIN OPERATING BASE
● ALERT BASE
▲ PRIMARY DISPERSAL SITE
△ SECONDARY DISPERSAL SITE

AIR MOBILE BASING CONCEPT

- MAIN OPERATING BASES
  - EXISTING MILITARY BASES
  - ONE BASE FOR 40 MISSILE CARRIERS
- ALERT BASES
  - EXISTING MILITARY AND JOINT USE BASES
  - NORTH AND SOUTH CENTRAL U.S.
  - 60 MILES SEPARATION
  - 60 MILES FROM SAC DISPERSAL BASES
  - RUNWAY REQUIREMENTS
    - AMST -- 5,000 FT LONG X 60 FT WIDE
    - WBJ -- 8,000 FT LONG X 90 FT WIDE

AIR MOBILE BASING CONCEPT (CONT)

- PRIMARY DISPERSAL SITES
  - EXISTING AIRFIELDS
  - NORTH CENTRAL U.S.
  - 60 MILES SEPARATION
  - 60 MILES FROM SAC DISPERSAL BASES
  - RUNWAY REQUIREMENTS SAME AS ALERT BASE
- SECONDARY DISPERSALS SITES
  - EXISTING AIRFIELDS
  - THROUGHOUT CONUS
  - SPACING VARIES WITH AIRCRAFT HARDNESS
  - RUNWAY REQUIREMENTS
    - AMST -- 2500 FT LONG X 40 FT WIDE
    - WBJ -- 5200 FT LONG X 60 FT WIDE

UNCLASSIFIED

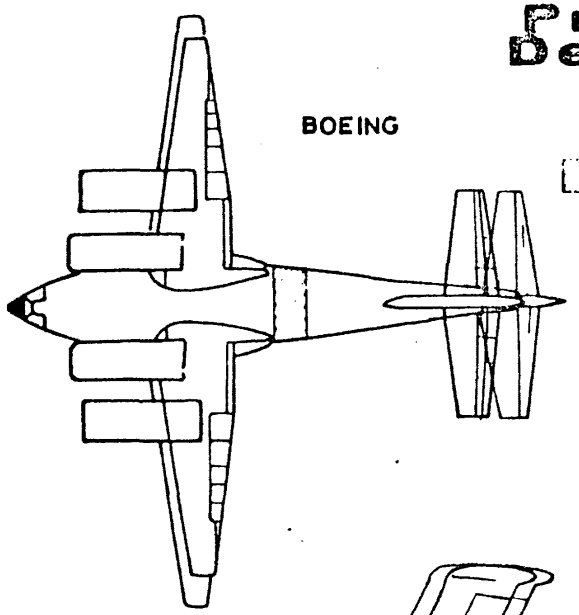
Configuration Definition

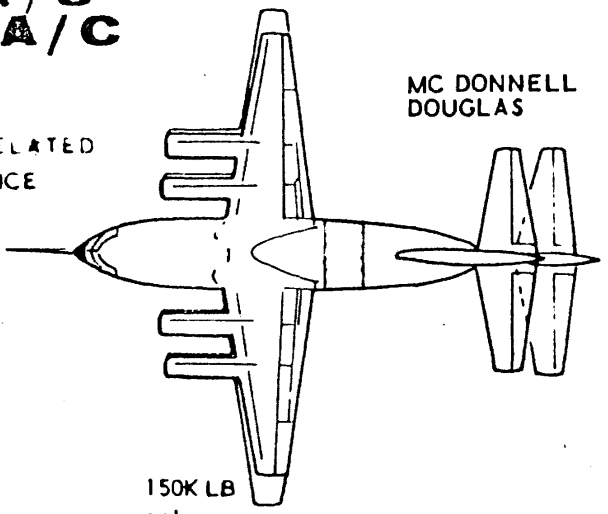
Proposal A/C
Derivative A/C

BOEING

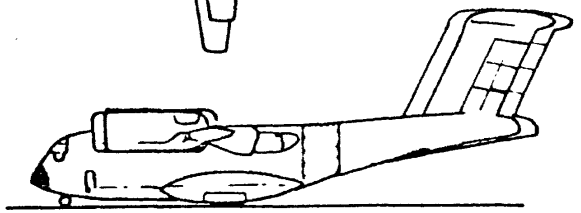
MC DONNELL
DOUGLAS

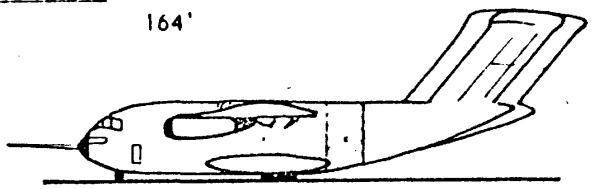
FUNCTIONALLY RELATED
OBSERVABLE DEVICE
-FROD

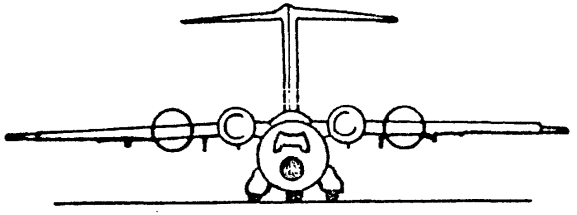


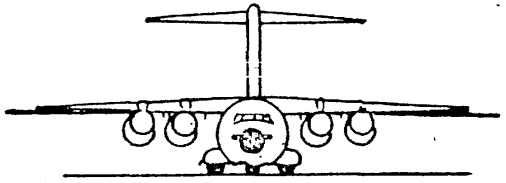


114K LB	MISSILE	150K LB
10'	FUS EXT	22'
35%	WING AREA INCREASE	44%
159'	WING SPAN	164'









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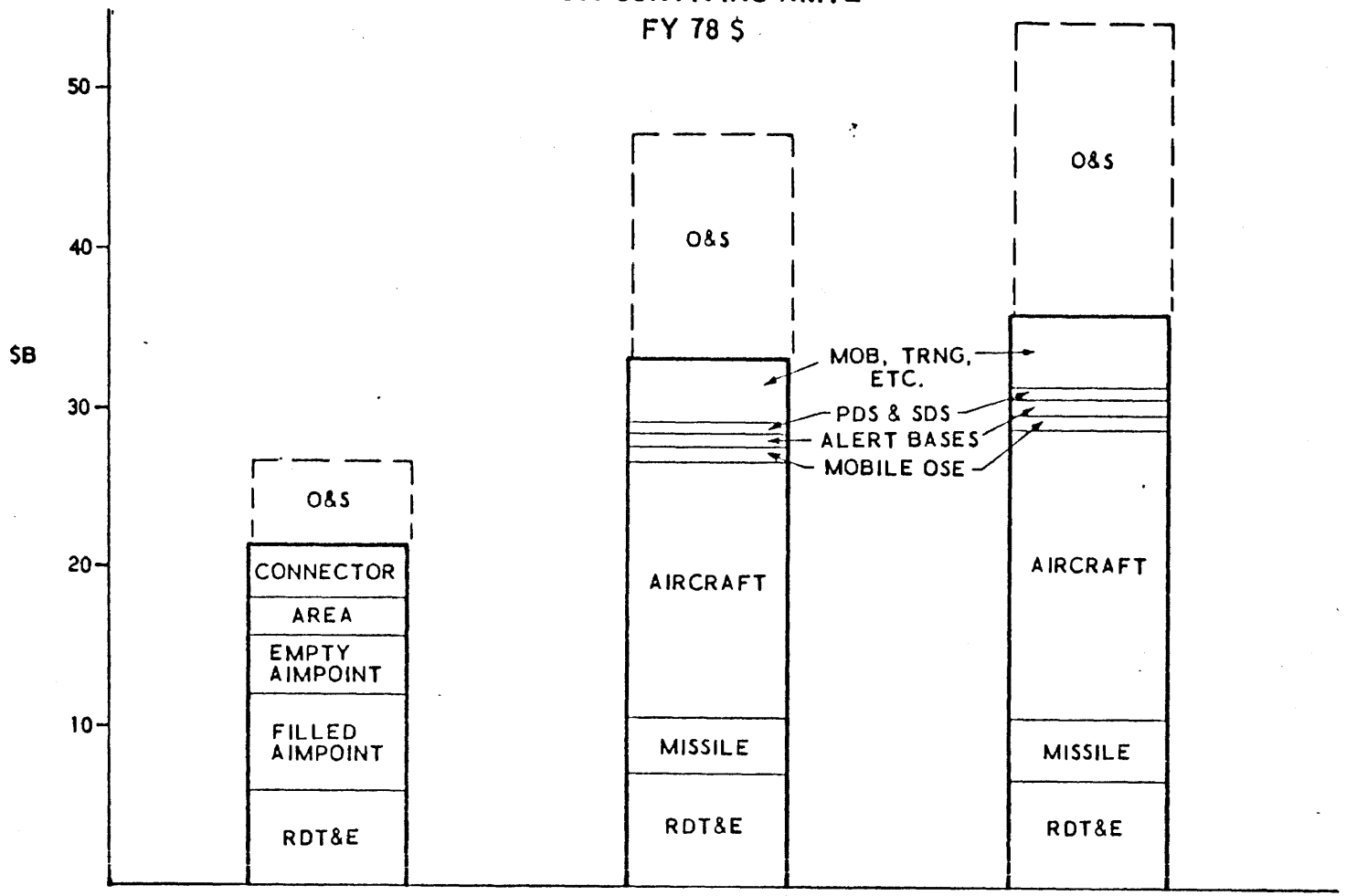
Program Cost Comparison

800 SURVIVING AMTE
FY 78 $



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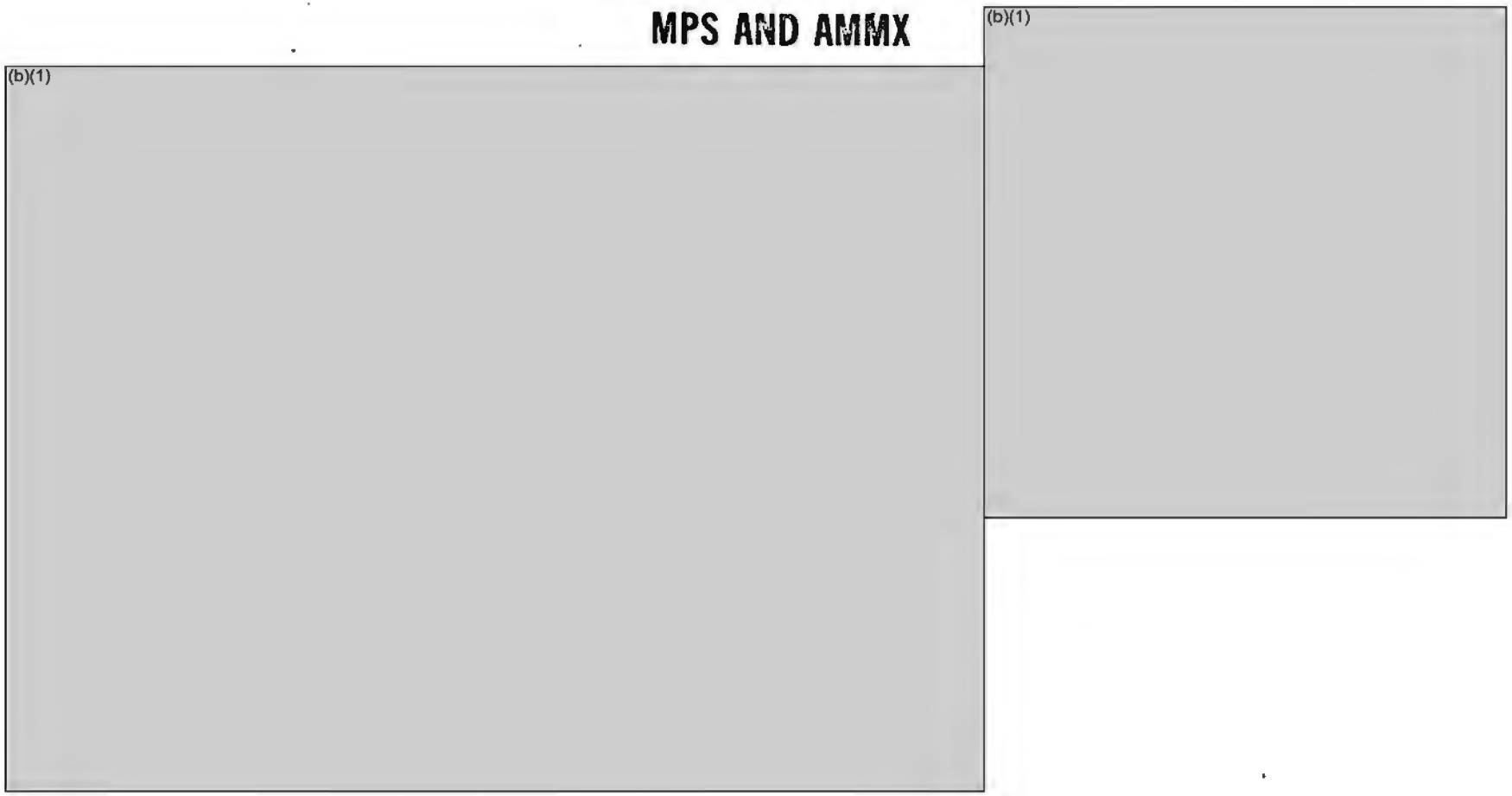
SURVIVING RVs vs COST
MPS AND AMMX



FY 78 DOLLARS IN BILLIONS
(RDT&E AND INVESTMENT)

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STRATEGIC AND TACTICAL WARNING

FACTORS INHIBITING PROPER REACTION TO STRATEGIC WARNING (IN HINDSIGHT)

- PERTINENT DATA LOST IN SEA OF EXTRANEOUS AND CONFLICTING DATA
- INSENSITIVITY OF ANALYSTS TO NEED OR OPPORTUNITY FOR OTHERS TO TAKE PROMPT ACTION OR WHO APPROPRIATE OTHERS ARE
- PERCEIVED HIGH PRICE FOR OVER REACTING TO FALSE ALARM
- UNCLEAR ASSIGNMENT OF RESPONSIBILITY AND AUTHORITY TO ACT
- LACK OF AGREED AND AUTHORIZED ACTION TO TAKE
- LACK OF A FEASIBLE ACTION TO TAKE

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TACTICAL WARNING

- PRESENT TRIAD CONCEPT TOLERANT OF DEFICIENCIES IN TACTICAL WARNING
- INCREASED EMPHASIS ON AIR BREATHING LEG OF TRIAD REQUIRES GREATER DEPENDENCE ON TACTICAL WARNING
  - PROVIDES MOTIVATION FOR DISRUPTION BY ENEMY
  - COULD OCCUR AS PRELUDE TO OR PART OF ATTACK ON U. S.
- CURRENT GUIDANCE
  - UNCLEAR ABOUT REQUIREMENTS FOR SURVIVABILITY AND RECONSTITUTION OF TACTICAL WARNING SYSTEMS
- MAJOR ADDITIONS TO CURRENT CAPABILITIES WILL BE NECESSARY

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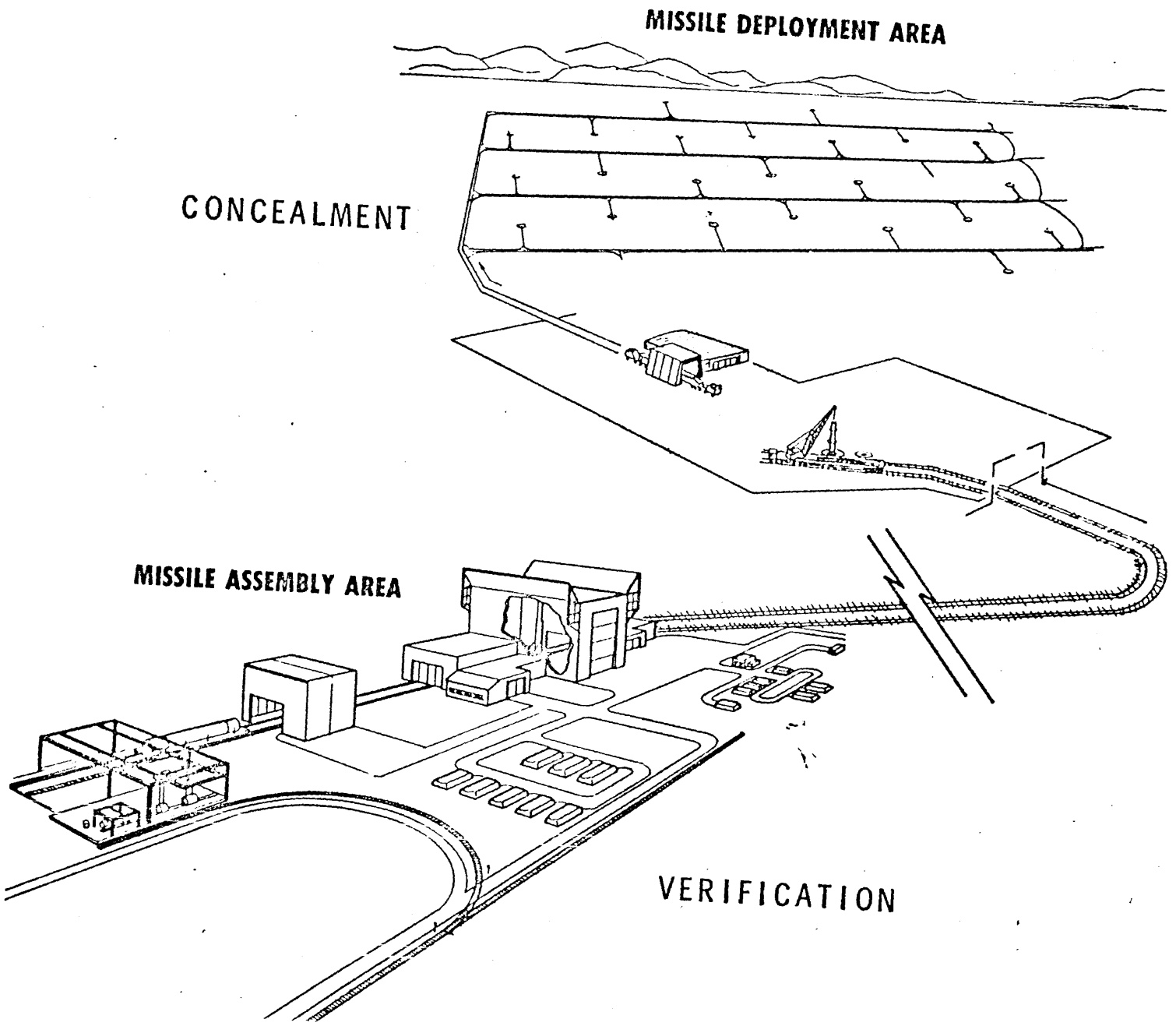
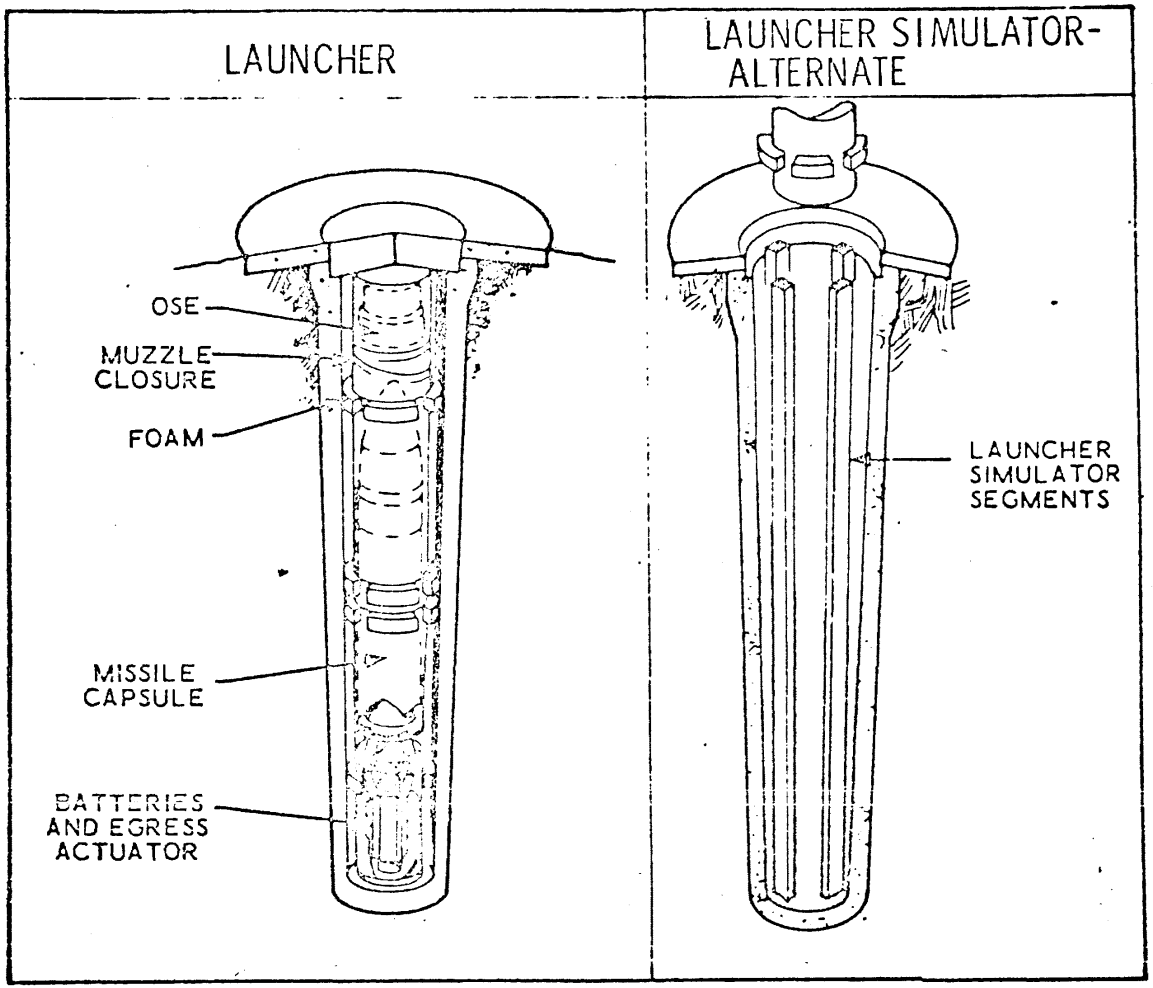
Baseline Verification Concept

- COUNT LAUNCHERS PRIOR TO INTRODUCTION INTO FORCE
- LAUNCHER/MISSILE PRODUCTION
  - NUMBER LIMITED BY TREATY
  - IDENTIFY PRODUCTION SITE/RATES - USE UNIQUE SHIPPING CONTAINERS
- LINK THE ASSEMBLY AND DEPLOYMENT PROCESS TO FORM CHOKE POINT--GEARED TO SOVIET INTELLIGENCE CYCLE TIME
  - LAUNCHER/MISSILE ASSEMBLY
  - ONE SITE
  - SLOW RATE ~ ONE/WEEK
  - RAIL TRANSPORTER ASSEMBLY PROCESS
  - MOVABLE ROOFS
  - ANNOUNCE EACH DELIVERY
  - NO MISSILE ASSEMBLY IN DEPLOYMENT AREA


MISSILE DEPLOYMENT AREA
CONCEALMENT
MISSILE ASSEMBLY AREA
VERIFICATION

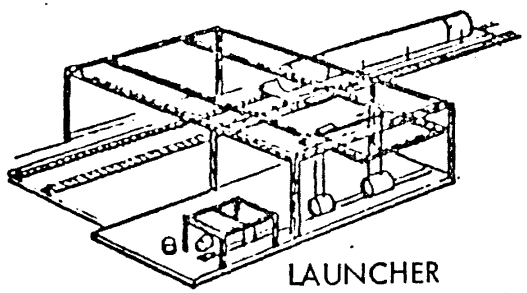
UNCLASSIFIED

MX VERTICAL SHELTER

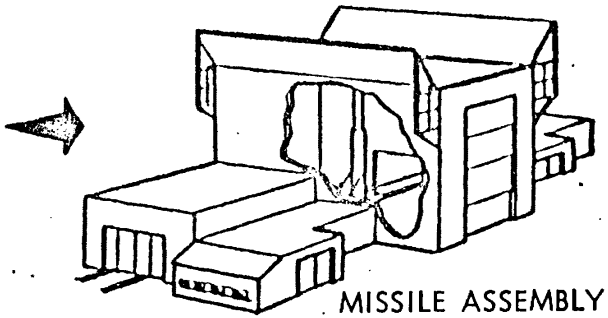


VERIFICATION

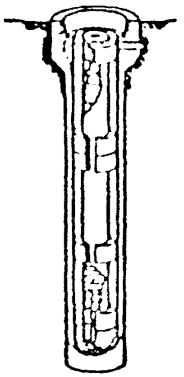
MX CONCEPT



LAUNCHER ASSEMBLY

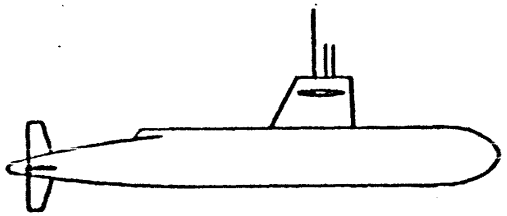


MISSILE ASSEMBLY

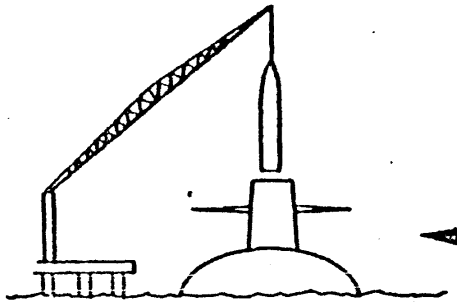


TO MISSILE DEPLOYMENT AREA

POLARIS/POSEIDON OPERATION



LAUNCHER ASSEMBLY
- GROTON, CONN



MISSILE ASSEMBLY
- BANGOR, WASH
- CHARLESTON, S.C.

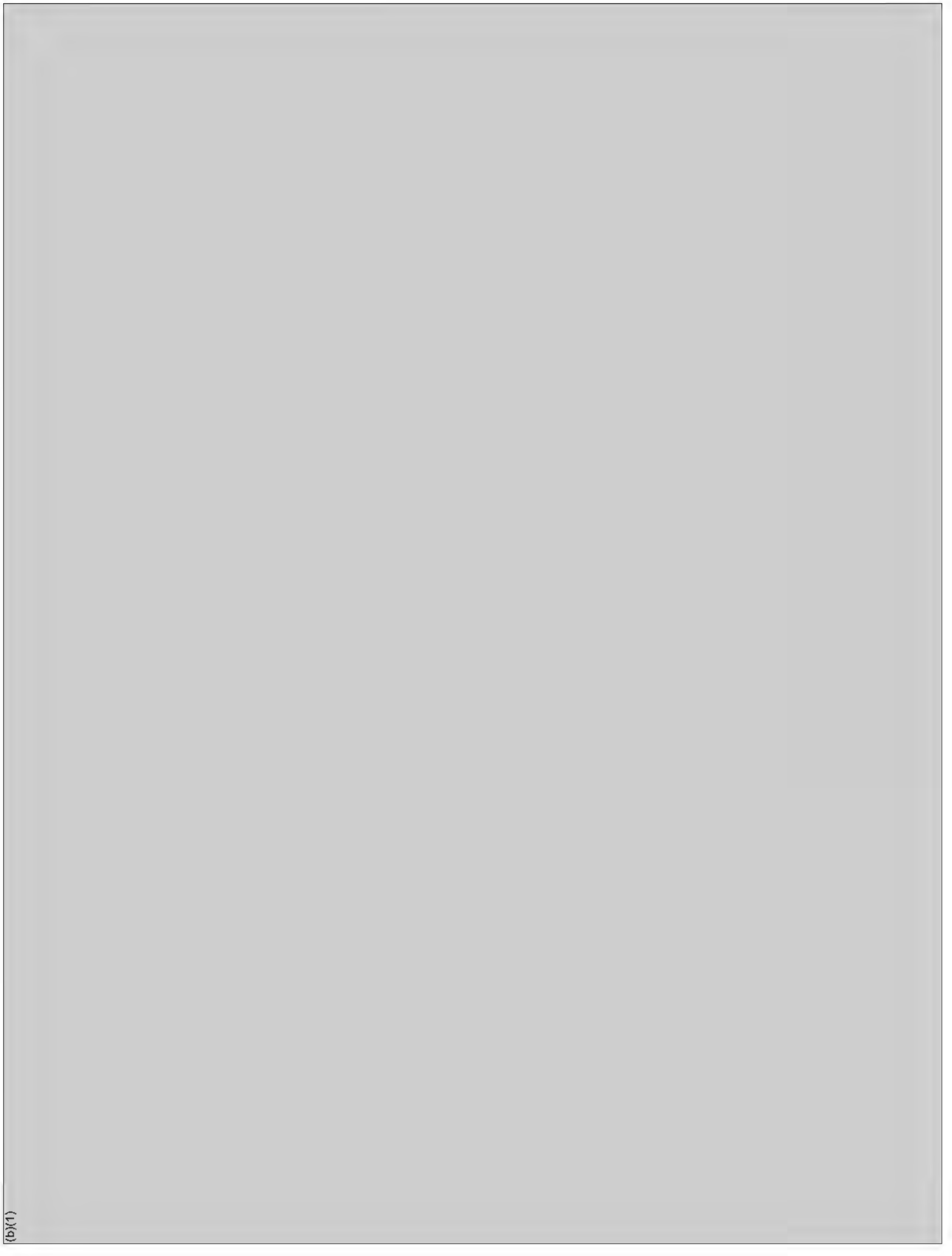
TO OCEAN DEPLOYMENT AREA

AIR MOBILE M-X VERIFICATION PRECEDENTS

- AIR MOBILE M-X VERIFICATION GENERALLY VIEWED AS NON-CONTROVERSIAL
  - PRECEDENT IN LIMITING/ VERIFYING MISSILE SURROGATE
  - PRECEDENT FOR FRODS/ODs ON STRATEGIC AIRCRAFT
  - PRECEDENT FOR NOT COUNTING RELOADS ON BOMBERS AND CMC
- BUT THERE ARE RESIDUAL CONCERNS DUE TO DIFFERENT M-X/ ALCM CHARACTERISTICS
  - CAN BE LAUNCHED FROM OTHER AIRCRAFT
  - CAN BE LAUNCHED FROM NON-AIRCRAFT LAUNCHERS
  - EXTRA MISSILES CAN POSE AS RELOADS

BOUNDING THE THREAT

- RESILIENCE FOR FIXED MPS
- COSTS OF SOVIET THREAT GROWTH VERSUS U. S. RESPONSE
- ACTIVE DEFENSE VS ADDITIONAL SHELTERS
- OTHER IMPLICATIONS OF EXTREMELY LARGE THREATS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ACTIVE DEFENSE VS ADDITIONAL SHELTER TRADEOFFS

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BREAKOUT IS COMMON TO ALL BASING ALTERNATIVES
THE QUESTION IS:

- HOW DOES U. S. REDUCE OPPONENT' S MOTIVATION OR INHIBIT HIS OPPORTUNITY TO BREAKOUT?
- WHAT BASING ALTERNATIVE WOULD U. S. PREFER TO BE IN IF STRESSED BY AN OPPONENT' S BREAKOUT?
- WHAT ARMS CONTROL PROVISIONS CAN REDUCE OR DELAY THE THREAT OF BREAKOUT?

UNCLASSIFIED

ARMS CONTROL COMPATIBILITY

- SALT AND MPS
- STRATEGIC STABILITY
- REDUCTIONS

UNCLASSIFIED

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SALT AND MPS

- STRONG SOVIET OBJECTION TO MPS LIKELY--
  UNDERCUTS A MAJOR SOVIET GAIN
  FROM THEIR POST SAL I ICBM PROGRAM
- INCREASES STABILITY--MAINSTREAM US SALT OBJECTIVE
- MPS NECESSARY BECAUSE SAL I
  DID NOT CONSTRAIN SOVIET THREAT TO SILO BASING
- SALT II WOULD BE CONSIDERED UNACCEPTABLE BY MANY
  IF IT ALSO ALLOWED SOVIET THREAT TO US ICBMS,
  BUT CONSTRAINED US PROTECTIVE RESPONSE
- LAUNCHER LIMITS WITHOUT MISSILE AND RV LIMITS
  HAS ALWAYS BEEN A DEFECTIVE CHARACTERISTIC
  WITHIN SALT PROCESS

~~SECRET~~

MPS AS THE LOGICAL CONVERGENCE OF U.S. EFFORTS TOWARD STRATEGIC STABILITY IN SALT

- ABM LIMITATIONS
  - PROVIDES ASSURANCE OF ICBM PENETRATIVITY
  - ESPECIALLY IN LIGHT OF MIRV/PEN AID HEDGES
- SNDV (STRATEGIC NUCLEAR DELIVERY VEHICLE) LIMIT
  - LAUNCHER LIMITATIONS
    - PROVIDES ONE STEPPING STONE TOWARD ASSURANCE OF ICBM LAUNCH SURVIVABILITY
- WEAPONS (MIRV) LIMITATIONS
  - PROVIDES, IN CONJUNCTION WITH LAUNCHER LIMITATIONS, AN UPPER BOUND ON WEAPONS THAT CAN THREATEN ICBMs
  - PROPOSED LIMITS TOO HIGH TO PROTECT U.S. ICBM SILOS
- MULTIPLE PROTECTIVE STRUCTURES (MPS)
  - MPS DEPLOYMENT AND THE ABOVE LIMITATIONS PROVIDE A POSTURE THAT IS RESILIENTLY STABLE
    - CRISIS STABLE--NO FIRST STRIKE INCENTIVE
    - TECHNOLOGY STABLE-- NO ADVANTAGE TO YIELD AND ACCURACY IMPROVEMENTS
    - FORCE LEVEL STABLE-- NO SENSITIVITY TO MODERATE CHEATING

~~SECRET~~

UNCLASSIFIED

MPS AND MUTUAL REDUCTION

- ONE SAL III OBJECTIVE IS MUTUAL REDUCTIONS; MPS WOULD LIVE IN SAL III
- MPS ALLOWS A DECOUPLING OF FORCE SIZE (MISSILES) FROM FORCE SURVIVABILITY (SHELTERS)
- ASSUMES SHELTER HARDNESS SPACING AND NUMBER NOT CONSTRAINED BY SALT
- MPS WOULD FACILITATE MUTUAL REDUCTIONS AND WOULD BENEFIT FROM ANY OBTAINED

UNCLASSIFIED

THE PATH AHEAD

UNTIL THE SOVIETS ARE WILLING TO ENTER INTO A STRATEGIC ENVIRONMENT
(FORCE POSTURE & SALT PROVISIONS) THAT ACCEDES TO U. S.
MAINTENANCE OF A SECURE, RETALIATORY CAPABILITY

WE MUST LOOK FORWARD TO A CONTINUED COMPETITION
IN FORCE DEPLOYMENT AND IN SALT TO MAINTAIN IT
-- AS BEST WE CAN