APPENDIX "A" TO ENCLOSURE "J"

RECENT DEVELOPMENTS IN SINO-SOVIET RELATIONS

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RECENT DEVELOPMENTS IN SINO-SOVIET RELATIONS

1. This Appendix is a summary of events in Sino-Soviet relations apparent to the end of the summer of 1960, with a note on the still obscure developments since then (until late November, 1960). These trends warrant special attention because they suggest the apparent range of strategies with which the Communists may oppose us, and because they suggest the ultimate possibility of useful political leverage which, if it ever materialized, might affect the nature of our strategies.

2. But attention to the forces and time periods which emphasize the divisive elements in the Sino-Russian relationship should not obscure the still powerful reasons for Sino-Soviet solidity of purpose on most routine issues of international politics, and above all in case of a critical confrontation with the U.S. Recent trends may continue. But the party line may change, at either place, Moscow or Peking, not once, but many times. It has changed before, many times. The significance of the differences that became evident during 1960 is that they demonstrated the reality and the range of potential policy differences within the Sino-Soviet Bloc.

3. The Sino-Soviet relationship deteriorated rapidly during most of 1960. Both parties have taken extreme positions, opening the way for increasingly serious actions and counteractions. In October there were some signs that the Chinese were tempering their views sufficiently to reduce significantly the degree of open antagonism. But there can be little doubt of the genuineness of doctrinal rift that had developed out of the divergent circumstances which impelled the Chinese and the Russians into

divergent policies. When the outcome of the November meetings is clear, it will be more evident than now what we may reasonably expect in the near future. But it is not believed that the expected words of nominal reconciliation will cure all of the sources of differences, and that the tendencies evident in the 1960 doctrinal dispute cannot be entirely removed quickly or by conference, and if it disappears in one form or context it is likely to appear again, later, in another form or context.

4. The Sino-Soviet dispute has been developing since 1957. At that time, the Chinese conceived their "great leap forward" in economic development -- a poorly planned program depending heavily on exhortation and coercion, contrary to Khrushchev's emphasis on material incentives. In early 1958, the Chinese conceived their audacious and heretical commune program. They launched this program without consulting the Soviet party, and they presented the communes as the form for an early "transition to Communism" and as worthy of emulation by other Communist states. They persisted in this program despite clear signs of Soviet disapproval. Although in 1959 Peiping modified both the commune program and the Chinese claims for it, the Soviets continued to disapprove the modified program and the remaining claims.

5. Originating in the same period was the even more critical dispute about world Communist strategy and tactics. This apparently began in divergent estimates of the Bloc's military power after the Soviet ICBM tests and sputnik launching in autumn 1957. Mao believed that the Bloc had clear military superiority, and that it thus could pursue a much more aggressive program all over the world -- short of initiating general war.

6. Over the following two years -- in party pronouncements, speeches by leaders, articles in party journals -- the issues of strategy and tactics in dispute between Moscow and Peiping were made clear. These were and still are: (1) whether the Soviet policy of low risks, "peaceful coexistence," and detente should be replaced by a more militant revolutionary policy, especially in the underdeveloped and former colonial areas; (2) whether the Bloc should seek to avoid local as well as general wars on the ground that local wars could get out of control (the Soviet view) or whether the Bloc should support and even incite wars of "liberation" and other "just" wars (the Chinese view); (3) whether disarmament is to be seriously negotiated with the West (the Soviets seem to say yes, the Chinese clearly say no); (4) whether Communist parties can usually or often take power in non-Communist countries without resort to armed uprisings and civil war; and (5) whether Communists in non-Bloc countries should press "minimum" (Soviet) or "maximum" (Chinese) programs, and to what degree they should cooperate with non-Communists such as socialists and trade unionists.

7. The Sino-Soviet dispute moved into its second stage in autumn 1959, with Khrushchev's trip to the United States and the preparations for summit talks. Khrushchev's policy drew heavy fire from Peiping, culminating in a series of unprecedently harsh and scornful Chinese attacks on Soviet strategy in Lenin Anniversary articles in April 1960.

8. It was apparent last June that the Chinese were not satisfied simply by the wrecking of the summit talks. The Chinese saw no signs of the fundamental change in Soviet policy for which they had long been calling. Thus, at a meeting of the World Federation of Trade Unions (WFTU) in Peiping in June,

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Chinese delegates spoke very strongly against Soviet positions, and they convoked private meetings with other delegates in which they denounced Soviet policies. Two of Mao Tse-tung's top lieutenants, Liu Shao-chi and Teng Hsiao-ping, were active in this way.

9. After the WFTU fiasco, the Soviet party immediately went on the offensive, quickly bringing the dispute into a new and critical phase -- similar to the Soviet-Yugoslav relationship in the spring of 1948 when Moscow was putting strong pressure on the Yugoslav party to force a change in policy or a change in leadership. A Pravda article of 12 June -- on "left-wing Communism" -- signalled the offensive.

10. The Soviet party made use of the Rumanian CP Congress at Bucharest, beginning 21 June, to convoke the Bloc parties and other parties of the Communist world. The Soviet party is reported to have sent to the other parties, in or about mid-June, a circular letter in support of its positions in the dispute with the Chinese.

11. Enroute to the Bucharest meeting, about 17 June, Soviet and Chinese representatives discussed their differences and could not resolve them. The Chinese representative is said to have promised to back down at Bucharest if the other parties were opposed to his positions.

12. It was apparently at this point that the Soviet party prepared an 84-page document which it distributed to the other parties on 21 June. This was presumably a more systematic and full account of the matters discussed in the Soviet circular letter of mid-June.

13. The Soviet party also indicated in public pronouncements the line it would take at Bucharest. A Pravda editorial of 20 June insisted that Bloc leaders "synchronize their watches," warned against "conceit" among Bloc leaders, and asserted that there could not be "two minds" on war and peace. Khrushchev spoke to the Rumanian party Congress on 21 June, strongly reaffirming his detente policy and declaring that those who interpret Lenin dogmatically "act like children." The Chinese delegate to the Congress, while fairly polite in his speech, also showed an intention not to yield any positions.

14. The Soviet letter of 21 June (cited above) -- distributed to the 64 other parties on the eve of the Bucharest meeting of World Communist parties which followed the Rumanian party Congress -- was a sensation, on the order of Khrushchev's "secret speech" of February, 1956, attacking Stalin.

15. The Soviet party letter began by rebuking the Chinese party for "improper and unacceptable" methods of criticizing Soviet policies -- during and after the WFTU Conference. These methods had included "circulating documents in all Communist parties" -- an unprecedented Chinese challenge to Soviet leadership of the world Communist movement.

16. The letter then accused the Chinese of failing to understand the changes in the world since Lenin's time, in particular the capability of the Bloc to restrain the aggressive plans of imperialism.

17. The letter then criticized the Chinese view that an eventual general war is inevitable, and that in any case there would be wars of other kinds. It accused Mao of having gone back on his agreement of November, 1957, that the Bloc should

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try to keep the peace for 15 years, after which the peace would keep itself.

18. The letter argued that "coexistence" did not -- as the Chinese charged -- impede the "liberation" movement. The Bloc, it said, would "support just wars" if necessary.

19. The letter reiterated the Soviet position that "peaceful coexistence" is not a "temporary tactical slogan" but is instead an objective necessity. It observed that a new general war would "wipe out nations and throw society back hundreds of years." It declared that the Soviet party was confident of a worldwide Communist victory after the Bloc had proved its industrial superiority during 10 to 15 years of "peaceful coexistence."

20. The letter went on to assert that coexistence did not mean an end to the "struggle." It pointed to recent developments in South Korea, Turkey and Japan, as evidence of gains that could be made.

21. The letter rejected the Chinese charge that the Soviet party was "flirting with the national bourgeoisie" -- Peiping's criticism of Soviet gradualist strategy for such countries as India, Indonesia and the UAR. It expressed confidence, contrary to the Chinese view, that bourgeois nationalist leaders weaken the forces available to the West.

22. The letter also rejected the Chinese charge that Khrushchev was throwing away the Bloc's military advantage. At the same time, the letter said the Chinese were wrong in regarding disarmament as an "illusion." Disarmament, at least to some degree, was possible and would work to the advantage of the Bloc -- both as an issue and as an accomplished fact.

23. The letter went on to rebuke the Chinese for disagreeing with the Soviet emphasis on the possibility of Communist parties winning power by peaceful means. It pointed out that the Soviet party did not say that this was the only way, simply that there were better possibilities for this way.

24. The letter then reproached the Chinese party for its "isolated" position in the world Communist front organizations (peace, labor, youth, women). The Chinese were said to have gone back on a 1954 agreement as to correct tactics.

25. The letter further criticized the Chinese party for failure to adhere in several respects to the November, 1957, declaration of the Communist parties which the CCP had signed. The letter extracted several passages from the declaration and set beside them contradictory statements from CCP pronouncements since 1957.

26. At this point, in discussing de-Stalinization, the Soviet letter took a slap at Mao personally. The Chinese position on Stalin -- not nearly as critical of Stalin as Khrushchev had been -- was said to obstruct the world Communist movement's work against the "cult of the individual." The implication was clear that there was another such cult in Communist China.

27. The letter went on to rebuke the Chinese party for criticizing the Soviet part "behind its back," for deriding the lines taken by other Communist parties, for "disloyal and uncomradely" behavior, for violating the principle of "proletarian internationalism," and for "lack of sincerity and respect" toward the Soviet party.

28. The letter observed that the Soviet party had "many times" tried to resolve its disputes with the Chinese party in bilateral talks which failed completely. The letter observed that the

Soviet party had not criticized Mao's ill-considered experiment with the "hundred flowers" in 1956-1957, and had tactfully criticized the CCP's rejection of the "Leninist principle of material incentive" (in the Chinese "leap forward" and commune programs).

29. The most important part of the letter -- because the Soviet and Chinese substantive positions were already known -- was the conclusion. In this the Soviet party showed an intention to force the Chinese to back down or accept some serious consequences.

30. This part of the letter reminded the Chinese of the "unprecedented" scale of Soviet aid to China's economic and military development. It then moved directly to the statement that "We must do everything to overcome the difficulties in this relationship without sacrificing principles." It appealed to the Chinese to "take into account the interests of the world Communist movement," and it expressed confidence that the CCP would "draw the necessary conclusions." It concluded that the interests of the Bloc and the world Communist movement are "inseparable from the interests of the building of Communism" in China -- in other words, it warned implicitly that a Chinese failure to conform would result in a reduction or withdrawal of Soviet aid.

31. Khrushchev is reported to have given the Communist parties at Bucharest two days to consider this 84-page circular letter. He then spoke to the meeting, and is said to have added some detail to the charges against the Chinese set forth in the letter.

32. He is said to have denied a Chinese charge that the USSR was not properly preparing for possible war with the West, and

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to have countered with a charge that the Chinese had refused to permit the Russians to build certain installations in China for Soviet military purposes. In this connection, he is said to have remarked, at Bucharest, that he was resisting Chinese pressure for nuclear weapons, weapons which the Chinese were not reliable enough to be given.

33. He is also said to have criticized Chinese "chauvinist" policies in disputes with non-Communist governments (i.e., India and Indonesia).

34. He is also said to have accused the Chinese of forming pro-Chinese "factions" in other Communist parties, and to have complained specifically that the CCP was indoctrinating Latin American Communists in anti-Soviet feeling and was recommending "armed struggle" to them against Soviet wishes.

35. He is also said to have compared Mao with Stalin in the insularity of his thinking.

36. The Chinese delegate at Bucharest, Peng Chen, a CCP politburo member close to Mao, is reportedly to have responded hotly to Krushchev's speech. Peng is said to have reaffirmed Chinese positions, and is variously reported to have made these specific points: ultimately there must be war with the West; in the meantime, there must be a much firmer Bloc line; the neutral countries are insignificant in the struggle, and lean more to the West than to the Bloc; Moscow had prevented the Eastern European parties from adopting domestic programs similar to Peiping's; the Chinese party should have a free hand in Asia; the Soviet party had tried to speak for Peiping in international councils without Chinese consent; the CPSU had organized the Bucharest meeting to discredit the CCP; the CCP had no confidence

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in Khrushchev's policies or in Khrushchev personally; and so on. An observer summed up Peng's performance as indicating that the Chinese did not retreat "one inch" at Bucharest.

37. Virtually all of the other Communist parties at the Bucharest meeting indicated their support of the Soviet position. It was perhaps this that induced the Chinese party to sign the innocuous Bucharest communique of the Communist parties. It was obvious to all, however, that this accommodation was unstable. The parties reportedly agreed to meet again in Moscow in November to try to reach a genuine resolution of the dispute.

38. The Chinese went home mad. There are credible reports that the Chinese party during the first week of July sent a stinging letter to the Soviet party.

39. The Chinese letter presumably rejected all of the positions set forth in the Soviet letter of 21 June and the charges added in Khrushchev's speech at Bucharest.

40. Judging from subsequent comments in the Chinese press, the Chinese letter of early July may have warned that, unless the Soviet party altered its positions to conform to Chinese positions, Peiping would expel Soviet technicians and would publicly renounce "all Soviet economic aid."

41. This Chinese letter apparently made the Soviet party as angry as the Chinese had been. The Soviet party is said to have fired back a letter stating its refusal to be dictated to by its junior. This letter, or one reflecting it, was reportedly sent to other Communist parties subsequently.

42. The Soviet party began at that time -- early July -- to prepare for the possibility of a break with the Chinese party.

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It organized party meetings all over the country to discuss the dispute. The Soviet Home Service started to prepare the Russian people as well, by ceasing comment on Chinese affairs; this was similar to the boycott of Yugoslavia in the spring of 1948. Journals published by both Soviet and Chinese "friendship" organizations ceased to be distributed. The Soviet press (Kommunist, 11 July) resumed its attacks on dogmatists, sectarians, and leftist doctrinaries: these were in part answered by a Chinese speech of 22 July attacking "modern revisionists."

43. The Soviet party's central committee held a plenum in mid-July. The plenum resolution "completely approved" the line taken by the Soviet delegation at Bucharest, and it made the serious charge that the Chinese -- not named -- were guilty of "left wing sectarian deviation" and "narrow nationalism." These charges were similar to -- although not as strong as -- the Cominform resolution of June, 1948, which expelled the Yugoslav party.

44. Shortly after the Soviet party plenum, there began a departure of Soviet technicians from China. It is still not clear who took the initiative in these departures -- that is, who first moved from threats to action.

45. The Soviet party continued to press the offensive in August with several harsh attacks in Soviet media on Chinese policies and actions. (Kommunist, early August; Pravda, 7 August; Ponomarev in Pravda, 12 August; Pravda, 13 August; Zhukov in Pravda, 26 August.) These statements charged the Chinese with "blasphemy," with drawing "absurd" conclusions from the current world situation, and with departing from and failing to understand Marxism. They also charged the Chinese with "disorganizing" and "disorienting" other Communist parties -- presumably in preparation for a formal charge, at some future Bloc conclave, that the CCP is "splitting"

the world Communist movement. Perhaps most important, Soviet and satellite media began to warn the Chinese -- named for the first time -- of the dreadful consequences for China of separation from the Bloc.

46. There were also abundant indications from the Chinese side during August that the Sino-Soviet relationship was deteriorating. Concurrently with the first departures of Soviet technicians, and just after a secret meeting of Chinese party leaders in Shanghai, a Shanghai journal published an emotional editorial emphasizing the advisability of relying on "one's own efforts." It observed that "reactionaries in some countries .... are trying to isolate us," are refusing "to let us progress to become rich and powerful." It declared, "we have a belly full of anger," and must use this anger for strength. This editorial was reprinted in the CCP's official party organ, People's Daily, on 13 August.

47. Also in early August, the Chinese, originally scheduled to send a huge delegation, did not attend the Orientalists' Congress in Moscow. And Mikoyan in his opening speech did not once mention China.

48. In mid-August articles in the Chinese press, there were further emotional passages. One article was by Li Fu-chan, a CCP politburo member responsible for long range economic planning. Li denounced the imperialists and "those who echo them" and declared that their "anti-Chinese activity" simply proved that "we are real Marxist-Leninists."

49. Li's article discussed the new policy of giving greater attention to the development of agriculture -- which reflected official concern over food shortages in China and reported inability to meet export quotas, but which also, perhaps, indicated

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and expectation of reduced Soviet aid to industry. In the same period, there were indications -- in Chinese overtures to Japan and other countries -- that Peiping may have been exploring the possibility of reorienting its foreign trade.

50. There were other articles in the Chinese press in August reaffirming positions known to be offensive to Moscow. On 13 August, People's Daily again denounced the "modern revisionists" and their "blasphemous talk" in criticizing Chinese positions on war. On 30 August -- replying to a 26 August Pravda defense of Soviet strategy for uncommitted countries -- People's Daily scored this Soviet strategy as a "violation" of Lenin's views, and it asserted that Mao's more aggressive line was "entirely" in agreement with Lenin's views and with the views of other Communist "faithful" to Marxism-Leninism.

51. As noted above, arrangements were made at Bucharest in June for another Bloc conclave in Moscow in November. During August, the Soviet party reportedly took a big step in preparing for the November meeting. It sent another letter -- reportedly the second since Bucharest -- to other Communist parties of the world in which it again set forth its positions in the dispute with Peiping.

52. In this letter the Soviet party admitted "sharp and strong" differences with the Chinese party. It expressed the hope that differences could be resolved and that discussion should never assume an "unhealthy" form, but it stated forthrightly that there "cannot be two opinions" on the matter of coordination between Communist parties and on "interpreting policy .... in a dogmatic manner." In other words, the Soviet party was asserting its leadership of the world Communist movement and its primacy in interpreting doctrine.

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53. The letter went on to explain again that Marxism must be applied in a changing world situation, and to assert that the Bloc is politically and militarily stronger than the West, a fact which effectively deters the West from war.

54. To achieve the defeat of imperialism, the letter said, the Bloc must win over the uncommitted countries, which would "rally around" the Bloc if the Bloc pursued a policy of "peaceful coexistence" accompanied by generous economic aid. Together with this, the Bloc would give "maximum possible support" to Communist parties in countries governed by bourgeois nationalists (Nehru, Nasser, Sukarno, Kassim, et al). Where Communist parties could function legally, the letter said, the task of providing support was comparatively simple; both the legal and the illegal parties should improve their underground organizations.

55. The letter went on to deny the Chinese charge that the Soviet party was thereby "strengthening .... reactionary regimes." The Chinese, the letter said, were "obsessed" by the "so-called strength of reaction" in the non-Communist world. The Communist cause was in fact making progress there, the letter said, whereas specifically Chinese prestige was falling. The Chinese had magnified "minor issues" (e.g., with India and Indonesia), and the resulting disputes had obstructed the Communist cause in "more than one way" and had made the work of the local Communist parties more difficult.

56. It was high time, the letter said, for this "dogmatic approach" of the Chinese to come to an end. To call the policy of coexistence revisionist was itself revisionist. To speak of the inevitability of war was to strengthen "war psychosis." It was un-Marxist to fail to observe the increasing conflicts between

Afro-Asian countries and imperialism, and between the government of Afro-Asian countries and the "democratic" (Communist) movements there.

57. The letter concluded that in the interest of the world Communist movement, controversies should not be "publicly fanned." To manifest discord based on "sheer dogmatism" amounted to helping imperialism. The "sacred task" of the Communist parties was to resolve these differences, and the "first opportunity" would be at the Moscow meeting in November. In the meantime, the Soviet letter would give world Communist leaders a basis for their deliberations.

58. There were further developments in late August. Observers reported that departures of Soviet technicians from China were continuing, and that in at least one city (Peiping) the Chinese had made security arrangements to screen the departures from the populace. By the end of August, although no reliable figures were available, it was estimated by observers in Peiping that one-third to one-half of all Soviet technicians had departed. There was an unconfirmed report that Khrushchev in his August letter to other Communist parties (see above) had criticized the expulsion of the technicians. In the same period, Soviet leaders began to appear in Bloc capitols, presumably to add their voices to the Soviet letters appealing for support against the Chinese.

59. In the fall of 1960, beginning shortly before the celebration of the 43rd Anniversary of the Bolshevik Revolution, there were some signs that Sino-Soviet relationships might take a turn for the better, superficially at least. There were a few official Chinese expressions of their enduring love of peace and even a statement for British TV consumption, by Chou En-lai, that

global war was not inevitable. (The Chinese have never contended that global war was inevitable.) A Chinese delegation showed up for the Moscow celebration and remained for the top level Communist policy meetings that followed the public celebrations.

60. There is little prospect of a full reconciliation so long as the present leaderships of the two parties are in power and so long as the basic conditions prevail which predispose the parties of the two countries toward different policies. The disagreement is fundamental and it is founded on conditions which cannot be lastingly overcome merely by conferences. There is no present reasonable expectation of either a total split, or a full restoration of the level of unity which existed between the USSR and China before 1957. The practical questions are not whether there will be divergences of interest and policy preferences, but rather, what form the weakened Sino-Soviet relationship may take, how far it may extend, and what effect the doctrinal competition and divergences of the two will have upon the Communist strategies that we must face in the next decade. The general nature of the range of possibilities on this score now seems to be reasonably well represented by the doctrinal differences of 1960, however uncertain it may be which tendency will prevail most often, or in what degree.

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APPENDIX "B" TO ENCLOSURE "J"

EFFECTS OF LIMITED WAR CAPABILITIES ON THE STRATEGIC NUCLEAR DETERRENT POSTURE

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EFFECTS OF LIMITED WAR CAPABILITIES
ON THE STRATEGIC NUCLEAR DETERRENT POSTURE

THE PROBLEM

1. To explore the interactions between nuclear deterrent and limited war capabilities.

SCOPE

2. This paper will address itself to the primary purposes of limited and general war capabilities in support of the policies of deterrence. It will relate the systems involved one to the other, and will discuss the effects of limited war capabilities on the strategic deterrent posture.

DEFINITIONS

3. As used in this paper, general war refers to wars in which strategic nuclear weapons are used against the homelands of the opponents; limited war refers to war in which strategic nuclear weapons are not used against the homelands of either side.

CONCLUSIONS

4. The present U.S. strategic posture, strong but not commanding in deterrence of general war, is weaker, but still substantial, in deterrence of large-scale aggression which might occur in developed areas, particularly in Europe.

5. As U.S. and Soviet postures approach strategic nuclear stalemate, U.S. strategic systems will be more uniquely effective in deterrence of general war, decreasingly effective in the deterrence of large-scale limited aggression.

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6. Tactical forces will have to assume an increasing responsibility to meet the threats of limited aggression, even large-scale aggression which might occur in Europe or elsewhere.

7. Any primary dependence of limited war forces on the employment of their tactical nuclear capability would restrict the effectiveness of these forces as a deterrent of Communist limited aggression.

8. Singly or in combination, the nuclear capabilities of strategic and tactical forces are ineffective in deterrence of small Communist aggression in underdeveloped areas.

9. A limited war posture, unduly weak in conventional capabilities in both manpower and weapons, can materially increase the probability of general war by accident or miscalculation and thus erode the deterrent effect of the strategic posture.

DISCUSSION

INTRODUCTION

10. An announced policy of the United States is the deterrence of Communist aggression. There are many factors which operate to deter a nation from a certain action; but passing over the effects of political beliefs, psychological motivations, and other intangibles one comes upon two elements which have important bearing on the ability of one side to deter another. One of these is possession of the requisite amount of power together with the ability to apply it; the other is the belief in the opponent's mind that this power will be used to prevent the accomplishment of his purpose. Should either of these elements be missing from the U.S. posture, when Communist aggression offers to them attractive possibilities of success, the deterrent policy is likely to fail.

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11. To further its deterrent policies the U.S. maintains a military posture including strategic and tactical forces, land, sea, and air. All of these systems interact in a complex fashion, and each complements the other in advancing the national objectives. To explore this interaction it is necessary to consider the systems separately, though always it must be borne in mind that none of the systems operates in isolation and that all contribute to the U.S. strategic posture in the deterrence of general and limited Communist aggression.

STRATEGIC NUCLEAR DETERRENCE OF GENERAL WAR

12. Of overriding importance to the nation is the deterrence of general nuclear war. The greatest military contribution to this deterrence is made by the strategic offensive weapons systems and, unless one side attains a position which it believes gives it so great an advantage that it can attack the other with relative impunity, it seems reasonable that, in the absence of accident or irrationality, mutual deterrence may succeed in the prevention of general war.

13. Since the capabilities of both the U.S. and the Soviet Union are fast progressing to where substantial fractions of their strategic forces should survive a nuclear attack, the mutual deterrence to use of strategic war as a rational instrument of national policy should be even stronger in the future. Absolute stalemate may never be achieved; but, factually, strategic stalemate has been with us for some time, and U.S. and Soviet belief in the deterrent capability of their systems should harden over the next few years.

STRATEGIC NUCLEAR POSTURE AS A DETERRENT OF LIMITED WAR

14. In the deterrence of limited aggression, again two important elements are necessary to success of the policy -- possession

of sufficient force to warrant belief that the U.S. could employ it to counter successfully a contemplated aggression, and a Communist credibility that the U.S. would actually apply the force. In spite of U.S. strategic posture intended to prevent Communist aggression, their aggressions have occurred several times -- in Korea, in Vietnam, in Hungary, in Tibet. Since the U.S. has not invariably succeeded in preventing Communist limited aggression, one or both elements must have been missing from the posture.

15. While strategic capabilities may be regarded as insuring that the homelands of the U.S. and the USSR will remain inviolate, and while we may claim that this posture will also bring the homelands of our allies underneath the protective umbrella, our allies do not place complete reliance on this policy. Consequently, they have taken measures to create their own deterrent. Neither we nor the enemy can easily believe that we would deliberately destroy the USSR and ourselves in response to a threat in some other area. The Soviets might entertain some doubts, however, about running even a small risk of enormous loss and, to this extent, the strategic capability contributes to deterrence of large-scale forms of aggression. Day by day, however, it becomes clearer that U.S. strategic systems are ineffective in deterrence of small limited aggressions. Our actual experience has been that the strategic systems have made no discernible contribution in deterring puppet states from undertaking aggression on their perimeters, nor have they prevented Communist elements from seizing power where the political climate was favorable. The strategic systems, then, have been inadequate to deter these types of aggression, not because of lack of nuclear power and means to deliver it, but because the Communists did not believe that U.S. would use it to stop their aggressions.

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Strategic systems, therefore, must be supplemented by other means.

THE LIMITED WAR POSTURE

16. Since U.S. national policy includes prevention of Communist expansion through limited aggressive actions, the nation must have adequate ready forces, ground, sea, and air, capable of quick reaction and of rapid movement to a threatened area. All of these forces must be so equipped that they can meet an enemy at least on an equal footing, and must be possessed of weapons systems adequate to the particular task at hand. They must be trained to operate against any forces which the enemy may bring against them. Of equal importance to the existence of these forces is enemy knowledge of their capabilities and his belief that they will be used should he undertake aggression. Friendly, neutral, and equivocal nations must also understand the capabilities and intent of use, else Communist ends can be more readily achieved through means more subtle than employment of force.

17. Both U.S. and Soviet ready-forces are now equipped with tactical nuclear weapons and both sides have trained in their use. Both sides have a conventional weapons capability as well, yet it is too well known for further elaboration here that the Soviets and their allies have much larger forces and much greater conventional capabilities than have the U.S. and its allies. In many areas of the world where limited war may occur, the Communists can have, initially, a decided conventional weapons advantage, an advantage which forces the U.S. to more dependence upon tactical nuclear weapons. Knowledge of this disparity in conventional strength is widespread as is knowledge that stated U.S. policy is to employ its nuclear capabilities to overcome the disparity.

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TACTICAL NUCLEAR WEAPONS IN LIMITED WAR[1/] -- UNDERDEVELOPED AREAS

18. The world, as it exists today and as it will exist during the next decade at least, is composed of two general classes of nations usually referred to as the developed and the less developed, or underdeveloped, peoples of the earth. Communist aggression may be committed against either class of nation and the U.S. may be involved in resisting that aggression, striving in so doing, to prevent the conflict from broadening into general war.

19. War in the underdeveloped areas is likely to find U.S. forces in a posture more vulnerable to nuclear weapons than that of its opponents. U.S. tactical and logistical doctrine requires vast quantities of supplies, extensive and complex communications systems, elaborate maintenance establishments, and good sea and airports. Where these facilities do not exist, they must be established. As long as this U.S. posture is maintained, it will always offer an enemy some good targets for nuclear weapons. An enemy, on the other hand, is usually accustomed to subsisting, marching, and fighting on less. He frequently resorts to guerrilla-type operations where small arms, light artillery, and conventional explosives have great advantages; hence, targets against which tactical nuclear weapons can be profitably employed are less likely to exist for the U.S. side than for the Communist side. If, in spite of these distinctions, the U.S. should first employ nuclear weapons in a limited war in some underdeveloped area, it is only prudent to expect that Soviet Russia would support its side with this type of weapon also; and, if the U.S. is so fortunate as to have

1/ For full treatment of this subject see WSEG Report No. 32, TOP SECRET, RESTRICTED DATA, Parts I, II, III and IV, dated 3 July 1958 to 15 July 1959.

sanctuaries from which to operate, it is quite likely that sanctuaries will be available to the enemy as well.

20. There can be situations in limited wars in underdeveloped areas where the use of tactical nuclear weapons could be militarily advantageous to the U.S. Most obvious of these are opportunities for naval attacks against targets at sea, for land-based air attacks against similar targets at sea or in the air, and for interdiction of approach routes through mountain passes or other defiles. These types of targets, however, are likely to be rare exceptions. In any event, before using nuclear weapons, the advantages of their employment should be most carefully weighed against the possibility of counter use and the military necessity for the use of nuclear weapons, rather than conventional explosives, should be clearly apparent.

21. In addition to the military disadvantages in which the U.S. might be placed by resort to tactical nuclear weapons, there are political and psychological considerations of grave import. Just as there now exists in the Free World a general abhorrence of war as a political instrument, so is there throughout the world a greater abhorrence of atomic war. People and nations everywhere are progressively acquiring more knowledge of the effects of nuclear weapons and deeper realization of the consequences of their use. If the U.S. first uses an atomic weapon in limited war in a backward area, she must be prepared to face a storm of adverse world criticism which will follow, not only from the Soviet propaganda agencies, but also from nations other than Communistic -- perhaps even from friends and allies. Even if tactical nuclear weapons could prove militarily useful in limited wars of the type under discussion, the possibility of a net loss in the overall struggle against Communism must not be overlooked.

22. In the backward areas, the effect of a tactical nuclear capability on the strategic system is clear in one way, not so clear in other ways. The possession of a tactical nuclear capability obviates the necessity of dependence on the strategic systems for deterrence of enemy use of nuclears in small wars in underdeveloped countries and, to that extent, should lower the chances of intercontinental nuclear war. The initial use of the weapon, however, may have the opposite effect. The skillful use of propaganda, at which the Soviets are adept, accompanied by their threats and attempts at nuclear blackmail, could not fail to heighten tensions in the world. Any increase in tensions trends to an increased danger of general war. With nuclear weapons employed on both sides, the conflict may expand to the point where sanctuaries cease to be honored and both sides may become so deeply involved that each additional increase in the scale of violence leads more and more in the direction of general war. Under these conditions, readiness of strategic forces will increase, intelligence may be misinterpreted, and national attitudes may be misunderstood to the point where one side or the other may conclude that his best hope of salvaging something of his national viability is to strike with all of the counterforce capability at his disposal.

23. Even the use of conventional arms alone would heighten tensions, as would any publicized conflicting maneuvers between the two opponents in situations short of war; but, should both sides refrain from the use of nuclears in limited war, the real issues in the struggle would tend to be less ambiguous in that they could not be obscured by a barrage of accusatory propaganda with which the Soviets would cover the entire world and which would emphasize the inhumanity of the U.S. in using

nuclear weapons against defenseless peoples for the callous pursuit of its own imperialism. As long as the policies of the U.S. and the Soviet Union remain antithetical, international tension will increase or decrease depending on the national attitudes of the moment. The point is that they should not be heightened by unnecessary unilateral U.S. action to the degree that they would materially increase the danger of general war. Whether the use of tactical nuclear weapons in an attempt to defeat a Communist limited aggression in an underdeveloped area would bring tension to the explosive point, no one can say with assurance. Of equal importance, perhaps, is the fact that no one can say that it would not. Certainly it appears that the chances of limiting a conflict are better when tactical nuclear weapons do not have to be relied upon to stop a limited aggression once it has been undertaken.

TACTICAL NUCLEAR WEAPONS IN LIMITED WAR -- DEVELOPED AREAS

24. Wars in developed areas of the world may well be large in scale. In Europe, for instance, the NATO alliance is face to face with Soviet and Satellite military power. There, an aggression against one NATO power is, by treaty, considered an aggression against all; yet there is no instrument which binds the NATO powers to a particular military reaction to a Soviet aggression in Europe, nor is there any binding agreement which requires the U.S. to resort to war should aggression occur.[1/] It is beyond the scope of this paper to determine the possible responses to Soviet aggression in Europe, or to investigate the circumstances under which a limited war could occur. The paper concerns itself merely with the limited war posture should limited war on any scale occur in Europe, the relationship of

1/ Article 5, North Atlantic Treaty, signed 4 April 1949.

tactical nuclear weapons to the posture, and the interaction of the whole with the nuclear deterrent posture.

25. The U.S. posture, indeed the entire NATO attitude in Europe, is defensive. No single nation, or group of nations in or composing NATO, contemplates offensive action against the Soviet or its allies; nor are deployments, attitudes or composition of forces indicative of initial offensive intent.[1/] Should hostilities break out in Europe, there would probably be intense initial effort to keep them limited. Tactical nuclears are there, and are readily available to both the U.S. and Soviet forces. A Soviet aggression would have to be met initially in the homeland of our Allies where any use of tactical nuclears unilaterally by the U.S. would cause casualties and devastation to the peoples and property of friendly nations. While it is true that delivery against targets beyond the boundaries of Western Europe and actions at sea or in the air would not necessarily have this disadvantage, it is entirely illogical to assume that an enemy would limit his actions to restraints which the U.S. might desire. In all probability the employment of nuclears by the western powers would bring a nuclear response from the Russians.

26. Any use of nuclear weapons in Europe would increase manyfold the likelihood of general war. It would be difficult, if not impossible, for contestants to know at once whether nuclear strikes were occasioned by tactical bombs or strategic bombs, whether missiles were tactical, intermediate range, or even intercontinental; or whether to expect the next salvo to be

1/ Soviets may consider U.S. strategic posture indicative of offensive intent. No qualified military analyst could regard NATO capabilities or deployments in Europe indicative of contemplated offensive action.

the strongest blow of all -- an all-out intercontinental strike. In a situation so grave, the stakes would be so high that either side might, with plausible reason, launch its intercontinental attack in desperation.

27. In and among developed countries outside Europe, many of the conditions discussed above would apply in any limited war situation. In Australia, for instance, or in Japan, nuclear weapons might be used initially to repel invasion from the sea or air without exposing the friendly countries to damage from our own weapons systems. Yet if we accept as a logical deduction that the initial use of a nuclear weapon is an invitation to its counter use, even a sea or airborne attack, if pushed beyond the shore line, could ultimately result in heavier damage to the homeland of the defending side than that which would occur had the participants used conventional weapons in the engagements. Although in these particular localities the threat of general war resulting from the use of nuclears might not be so great as in Europe, the propaganda war could be severe, world tension would increase, and the problems of keeping the war limited would be enhanced.

THE ROLE OF TACTICAL NUCLEAR WEAPONS

28. A posture for the conduct of limited war in the developed areas of the world definitely calls for a U.S. tactical nuclear capability. Faced by an enemy so equipped, and without this capability, U.S. forces and friendly nations would be powerless to offer more than token resistance to a Soviet tactical nuclear attack, or else would necessarily have to depend on the strategic nuclear deterrent. We have already observed that this deterrent does not always deter.

29. The possession of a tactical nuclear capability and the use of the capability are two different matters entirely. In the developed areas of the world, even more than in those underdeveloped, tactical nuclears offer their greatest service in deterring the use of nuclears by an enemy. U.S. forces must be equipped with tactical nuclears and trained in their use, just as they must be prepared to operate under the threat of their employment by an enemy. But should these weapons actually be employed by either side, U.S. strategic systems must be continually primed and ready to go, either in a first-strike counterforce role or, surviving a Soviet strike, ready to launch against targets in the Soviet homelands.

SYNTHESIS OF THE LIMITED WAR POSTURE

30. The analysis developed in the above discussion has shown that strategic offensive weapons systems which compose the U.S. general war deterrent have been adequate to their primary mission and may so continue into the future. It has also developed the fact that these systems are inadequate to deter limited wars, and must be supplemented by systems which are designed to further that policy of deterrence. This supplemental capability has, up to the present time, failed to be completely successful. A limited war posture, to deter Soviet aggression in any type of society and in any areas where the Communists may contemplate military aggression, must be composed of both conventional and nuclear weapons systems where the nuclear systems may find their best role in the deterrence of the use of nuclears by an enemy; but where the actual employment of nuclears by U.S. forces may be disadvantageous, not only from the military point of view, but disadvantageous also in the political and psychological struggle between the Communistic and Free World nations. It follows, then, that

the U.S. limited war capabilities should be built around a strong but flexible conventional weapons system with tactical nuclears available chiefly to deter their use by an enemy, or where their employment would be clearly and unequivocally to the advantage of the United States.

31. Since true deterrence of limited aggression depends on the credibility of use of the deterrent in the enemy's mind, the posture must be so designed that the capability of its employment is obvious. This means that limited war forces must exist in numbers sufficient to offer stiff resistance to enemies and strong support to friends. These forces, consisting of ground, sea, and air components, must be so organized, trained, equipped, and supported that they can react fast, arrive promptly in any threatened theater, and engage immediately in combat should it prove necessary. They must be capable of "tailoring" to fit the mission they are to undertake. Credibility of the existence of these forces, and of the U.S. intent to employ them against a Communist limited aggression must exist, not only in the minds of enemies, but in the minds of friendly peoples as well.

32. U.S. tactical forces, as presently configured, present the enemy with a very ambiguous threat. In many instances, the tactical nuclear weapon is of the same type and yield as is the strategic nuclear, a situation which gives little flexibility to the tactical systems. Moreover, the emphasis in development has been toward tactical delivery systems oriented primarily to nuclear weapons and much less toward delivery of conventional ordnance. Research and development for improvement of conventional ordnance and the means to deliver it continue to lag. 1/

1/ WSEG Report No. 48, TOP SECRET, 1 August 1960.

33. Numerically weak, and therefore weak in terms of pure conventional capabilities, tactical forces cannot effectively counter enemy aggressive actions except where circumstances preclude the enemy from massing his strength against us. Where the enemy can mass conventional forces against us, our ability to engage him is predicated upon use of nuclear weapons in quantity; yet where the enemy can face us with such a threat we are also restrained from using nuclear weapons, not only by local national vulnerabilities, but also by our own forces' vulnerabilities to Soviet nuclear counterattacks. Thus our posture directed toward deterring limited wars is not very convincing to an enemy who either initiates his action with nuclear attacks or initiates with conventional forces hoping to keep the war nonnuclear. To some extent, particularly in Europe, the Soviets would be deterred from initiating tactical nuclear war by their desire to limit destruction of European resources, their fear of nuclear reprisals from NATO countries which have their own nuclears, and their fear of our nuclear capabilities; but a numerically strong conventional U.S. tactical capability, supported by a tactical nuclear capability held in reserve, would certainly be a more reliable deterrent to any major aggression.

EFFECTS OF LIMITED WAR CAPABILITIES ON THE STRATEGIC NUCLEAR DETERRENT POSTURE

34. Having observed that strategic and limited war postures interact one with the other, it now becomes possible to state some of the ways in which the limited posture affects the strategic. An adequate limited war capability has been shown to contribute to the nuclear deterrent, but probably an effective strategic nuclear posture could deter general war without this contribution. A strategic deterrent, however, has proven inadequate to deter limited war. A limited war capability,

built preponderantly around a nuclear capability, cannot reduce the necessity for strategic systems. On the other hand, since this posture can increase tension and the danger of general war, it may increase the scale on which strategic systems must be developed and maintained. It has been shown that a tactical nuclear capability in the limited war posture is necessary to deter the use of nuclears by an enemy engaging in aggression, but it has also been shown that the initial use of nuclears in limited war can increase the danger of broadening the conflict into general war.

35. A limited war capability built around conventional weapons systems with nuclears ancillary and associated with sufficient strength in manpower, provided posture and intent were made credible, could reduce tension and render, to some extent, the outbreak of general war less likely. This kind of force posture would serve to reduce issues the resolution of which would otherwise depend on the use of nuclear weapons. This does not mean, of course, that the development of sophisticated strategic systems should cease. It does mean that the overall strategic aims of the United States would be in a better position for achievement and that a realistic limited war posture, with tactical nuclear weapons viewed in proper perspective, could improve the deterrent effect of the strategic systems.

APPENDIX "A" TO ENCLOSURE "F"

ESTIMATED COSTS AND FUNDING REQUIREMENTS FOR STRATEGIC OFFENSIVE WEAPONS SYSTEMS; FY 1961-1967

1. Statistics of system costs and program funds summarized in preceding sections of this Enclosure are based on detailed data given in this Appendix.

2. Table I presents estimates of unit costs, excluding bombs and warheads, for seven different aircraft, three air-to-surface missiles and four surface-to-surface missiles. Three different measures of costs are given: (1) investment costs including RDT&E and industrial facilities, (2) investment costs excluding RDT&E and industrial facilities, and (3) annual operating costs. Item (2), the middle column of figures, represents the approximate cost of procuring one additional unit of the specified weapon, together with its related supporting facilities and equipment.

3. Accurate estimates of the costs of the B-70 system are not available. The Air Force calculates that a development program for 12 aircraft, 11 of which will later be recycled to tactical status, will total $2.29 billion upon completion in FY 1967. This amounts to a total cost of $191 million per aircraft. Very preliminary WSEG estimates for a post-development 7-squadron operational program come to $64 million per aircraft for investment costs, and to $3.5 million per aircraft per year for annual operating costs.

4. Tables II and III provide the best available data on direct and indirect costs attributed by the Atomic Energy Commission to nuclear weapons associated with strategic systems. The reported costs in all cases pertain to the highest yield model of each specified bomb or warhead. Lower yield versions of the same

weapons almost always cost less, the only significant exceptions being in the "clean" variants of certain bombs. Fabrication and other non-nuclear costs are generally the same for any particular weapon regardless of yield.

5. Estimates of the unit costs of surface-to-surface missiles are combined with the costs of their warheads in Table IV. The delivery system costs in this tabulation are taken directly from Table I, and the costs of their warheads are derived from details given in Table III.

6. The amounts of funds allocated through FY 1967 to each of the strategic weapon systems, with details by year for three principal classes of funds, are given in Table V.

TABLE I

AVERAGE INVESTMENT AND ANNUAL OPERATING COSTS PER AIRCRAFT OR MISSILE FOR STRATEGIC WEAPON DELIVERY SYSTEMS a/

System	Cost per A/C or Missile ($1,000) Additional Investment Including RDTE and Other Initial Costs b/	Additional Investment Cost for an Additional A/C or Missile c/	Average Annual Operating Costs per A/C or Missile d/
Aircraft			
B/RB-47	4,087	3,990	589
B-52	14,150	13,511	1,107
B-58	34,407	33,213	851
KC-97	2,243	2,235	400
KC-135	4,678	4,666	360
C-124	2,761	2,753	599
B-70	NA	64,000	3,500
ASM			
GAM-72 (QUAIL)	670	637	18
GAM-77 (HOUNDDOG	1,631	1,487	48
GAM-87 (SKYBOLT)	1,231	989	50
SSM			
ATLAS:			
3x3, Soft, LOX/RP-1	35,100	17,800	1,330
1x9, Hard, LOX/RP-1	33,100	16,800	1,250
1x12, Hard, LOX/RP-1	36,500	18,500	1,360
TITAN:			
3x3, Hard, LOX/RP-1	32,300	18,800	1,670
1x9/1x18, Hard, Storable	26,700	15,600	1,490
MINUTEMAN:			
Fixed-Base	3,280	2,678	646
Rail-Mobile	4,190	3,443	924
POLARIS/SSBN: e/			
Average A-1 or A-2	NA	9,112	625
Average A-3	NA	9,300	625
Average for Program, Including Replacement	15,300	10,580	625

a/ All estimates except those for B-70, MINUTEMAN, and POLARIS are based on funding data and force levels given in Form A of MS-3½ Report on Selected Strategic and Tactical Weapon Systems, prepared by Directorate of Budget, Hq USAF, 11 April 1960. Details for MINUTEMAN and POLARIS are presented in Appendices "B" and "C". Figures for the B-70 are preliminary WSEG estimates, see paragraph 3 above.

b/ Represents the sum of RDT&E, "Total Procurement", and "Military Construction" through FY 1965 divided by the peak number of unit equipment aircraft or missiles.

TABLE I (Continued)

c/ Represents the sum of "Procurement for Service Use", and "Military Construction" through FY 1965, divided by the peak number of unit equipment aircraft or missiles. Funds for "RDT&E" and "Procurement - Industrial Facilities" are excluded from this average.

d/ Represents the sum of "Operations and Maintenance" and "Military Personnel" for FY 1958 to FY 1965, divided by the cumulative number of aircraft or missile years in that period.

e/ The averages for A-1 or A-2 and for A-3 assume only one set of missiles, i.e., shipfill, shakedown, and support for each SSBN, while the investment costs based on total FBM funds include the cost of 729 additional A-2 and A-3 missiles to replace all of the A-1's by FY 1964 and all of the A-2's by FY 1968 (See Appendix "C" for details).

f/ See Annex "B", Appendix "C" for basis of estimates.

TABLE III

WEIGHT, YIELD AND UNIT COST OF SELECTED WARHEADS FOR STRATEGIC MISSILE SYSTEMS [a]

	Mk 28, Mod 0, Y1	XW-38-X1	Mk 39, Mod 1, Y1	TX-41 Y1	XW-47	Mk 49, Mod 1, Y2	TX-53	XW-56	Cluster WH of POLARIS [b]
Weight (Lbs)	1,645	3,080	6,230	8,829	710	1,665	6,900	680	720
Yield (KT)									600
Cost per Unit ($1000)									
a. Nuclear Cost									
(1) Materials [c]									
(a) Oralloy									
(b) Plutonium									
(c) Tritium									
(d) Li D									
Total Materials									
(2) Depreciation of Materials Facilities									
Total Nuclear Cost									
b. Non-nuclear Costs									
(1) Fabrication									
(a) Nuclear Materials Fabrication	7	36	11	26	26	17	25	26	70
(b) Other Materials and Fabrication	23	173	31	99	93	25	50	63	180
Total Fabrication	30	209	42	125	119	42	75	89	250
(2) Depreciation of Fabrication Facilities	3	5	4	4	3	3	4	3	12
Total Non-Nuclear Cost	33	214	46	129	122	45	79	92	262
c. Total Cost:									

a/ See footnote a/, Table II. The warhead elements of the TX-41 and TX-53 bombs are included here since they may be modified for use in advanced missile systems.

b/ All estimates for this weapon are preliminary.

c/ See footnote b/, Table II.

TABLE IV

INVESTMENT AND OPERATING COSTS FOR STRATEGIC MISSILE SYSTEMS, INCLUDING DELIVERY VEHICLES AND WARHEADS; AVERAGE COST PER OPERATIONAL MISSILE AND WARHEAD

TABLE V

STRATEGIC WEAPON SYSTEMS - ESTIMATED RDT&E INVESTMENT AND OPERATING COSTS, FY 1960 - 1967, BY SYSTEM a/
(Million Dollars)

System and Class of Funds	1960 & PY	1961	1962	1963	1964	1965	1966	1967
Aircraft & Related Systems								
Bomber Aircraft								
B-47	7,570	635	508	402	305	180	0	0
RDTE	9	-	-	-	-	-	-	-
Investment	5,416	1	1	-	-	-	-	-
Operating	2,145	634	507	402	305	180	-	-
B-52 (Ground Alert)	9,877	1,391	1,358	783	821	840	789	764
RDTE	205	-	-	-	-	-	-	-
Investment	8,349	782	695	62	50	45	-	-
Operating	1,322	609	663	721	771	795	789	764
B-58	2,793	522	494	77	83	83	91	91
RDTE	85	-	-	-	-	-	-	-
Investment	2,698	494	438	-	-	-	-	-
Operating	10	28	56	77	83	83	91	91
Bomber Aircraft Total:	20,240	2,547	2,360	1,263	1,209	1,103	880	855
RDTE	299	-	-	-	-	-	-	-
Investment	16,463	1,276	1,134	62	50	45	-	-
Operating	3,477	1,271	1,226	1,201	1,159	1,058	880	855
Air-to-Surface Missiles								
GAM-72	206	63	5	6	6	6	6	5
RDTE	11	-	-	-	-	-	-	-
Investment	192	60	-	-	-	-	-	-
Operating	3	3	5	6	6	6	6	5

TABLE V (Cont'd)

System and Class of Funds	1960 & PY	1961	1962	1963	1964	1965	1966	1967
GAM-77	480	167	41	18	18	17	15	8
RDTE	43	11	5	-	-	-	-	-
Investment	432	150	22	-	-	-	-	-
Operating	5	6	14	18	18	17	15	8
GAM-87	38	60	157	294	288	253	30	41
RDTE	38	60	54	59	-	-	-	-
Investment	-	-	103	235	285	237	-	-
Operating	-	-	-	-	3	16	30	41
GAM Total	724	290	203	318	312	276	51	54
RDTE	92	70	59	59	-	-	-	-
Investment	624	210	125	235	285	237	-	-
Operating	8	10	19	24	27	39	51	54
Support Aircraft								
KC-97	2,419	247	216	154	93	53	0	0
RDTE	-	-	-	-	-	-	-	-
Investment	1,610	4	1	-	-	-	-	-
Operating	809	243	215	154	93	53	-	-
KC-135	2,471	372	498	356	470	241	241	240
RDTE	1	-	-	-	-	-	-	-
Investment	2,261	240	337	174	262	-	-	-
Operating	209	132	161	182	208	241	241	240
C-124	271	24	16	11	11	11	11	11
RDTE	-	-	-	-	-	-	-	-
Investment	177	-	-	-	-	-	-	-
Operating	94	24	16	11	11	11	11	11
RB-47	891	48	36	25	25	25	20	0
RDTE	-	-	-	-	-	-	-	-
Investment	641	-	-	-	-	-	-	-
Operating	250	48	36	25	25	25	20	-

TABLE V (Cont'd)

System and Class of Funds	1960 & FY	1961	1962	1963	1964	1965	1966	1967
Support Aircraft Total	6,053	690	766	546	599	330	272	251
RDTE	1	-	-	-	-	-	-	-
Investment	4,689	244	338	174	262	-	-	-
Operating	1,363	446	428	372	337	330	272	251
Aircraft Development Projects, Total	1,199	402	565	615	400	234	69	14
ANP (RDTE Only)	478	72	75	92	106	93	40	10
B-70 (RDTE Only)	721	330	490	523	294	141	29	4
Aircraft and Related Systems, Subtotal	28,215	3,931	3,894	2,742	2,520	1,943	1,272	1,174
RDTE	1,591	474	624	674	400	234	69	14
Investment	21,776	1,730	1,597	471	597	282	-	-
Operating	4,848	1,727	1,673	1,597	1,523	1,427	1,203	1,160
Surface-to-Surface Missile Systems								
ATLAS	3,204	1,278	354	316	139	139	174	162
RDTE	1,812	245	114	56	-	-	-	-
Investment	1,301	961	155	140	-	-	-	-
Operating	91	72	85	120	139	139	174	162
TITAN	2,182	1,039	945	954	1,084	888	278	331
RDTE	1,504	425	230	204	187	90	-	-
Investment	656	575	646	662	763	621	-	-
Operating	22	39	69	88	134	177	278	331
MINUTEMAN	559	522	1,223	1,991	2,472	2,095	1,526	1,569
RDTE	507	312	265	143	87	30	-	-
Investment	52	210	958	1,795	2,050	1,249	208	-
Operating	-	-	-	53	335	816	1,318	1,569

TABLE V (Cont'd)

System and Class of Funds	1960 & PY	1961	1962	1963	1964	1965	1966	1967
POLARIS	2,496	1,256	1,857	2,264	2,044	1,050	850	542
RDTE	1,122	485	602	533	247	128	75	57
Investment	1,354	725	1,174	1,627	1,648	714	458	77
Operating	20	46	81	104	149	208	317	408
OTHER[b]	2,511	42	43	43	34	31	31	0
RDTE	908	-	-	-	-	-	-	-
Investment	1,536	-	-	-	-	-	-	-
Operating	67	42	43	43	34	31	31	0
Surface-to-Surface Missile Subtotal	10,952	4,137	4,422	5,568	5,773	4,203	2,859	2,604
RDTE	5,853	1,467	1,211	936	521	248	75	57
Investment	4,899	2,471	2,933	4,224	4,461	2,584	666	77
Operating	200	199	278	408	791	1,371	2,118	2,470

[a] Data do not reflect actions taken since April 1960 on the FY 1961 budget.
[b] SNARK, THOR, and JUPITER.

APPENDIX "B" TO ENCLOSURE "F"

ESTIMATED COSTS OF THE MINUTEMAN WEAPON SYSTEM

APPENDIX "B" TO ENCLOSURE "F"

ESTIMATED COSTS OF THE MINUTEMAN WEAPON SYSTEM

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APPENDIX "B" TO ENCLOSURE "F"

ESTIMATED COSTS OF THE MINUTEMAN WEAPON SYSTEM

PURPOSE

1. To present estimates, developed by WSEG with the assistance of Air Force agencies of the costs of the MINUTEMAN weapon system.

SUMMARY OF THE ESTIMATES

2. The estimates in this paper are predicated upon force objectives of 2000 fixed-site missiles and 300 mobile missiles. Total program costs for the FY 1961-67 period are estimated at about $11.4 billion of which $7.6 billion represents research, development, test, and evaluation costs, outlays for industrial facilities, and investment in deployed missiles. The remaining $3.8 billion comprises the total of all operating costs of deployed squadrons during this program period. A summary of the estimates appears in Table I.

TABLE I

SUMMARY OF MINUTEMAN PROGRAM COST ESTIMATES, FY 1961-67

(Millions of Dollars)

Item	Cost
Research, Development, Test and Evaluation	837
Industrial Facilities	40
Missiles and Spare Parts	2,176
Support Equipment and Spare Parts	3,280
Construction a/	1,000
Other	230
Subtotal	7,563
Operating Costs (less training missiles included above)	3,835
Total Program Costs	11,398

a/ 100 psi silo and 500 psi LCC.

3. Estimated initial investment and annual operating costs per deployed missile, in millions of dollars, are:

	Fixed System	Mobile System
Investment Cost	$2.678	$3.443
Annual Operating Cost	0.646	0.924

4. Experience with several modern weapon systems has shown that cost estimates made prior to the time of operational deployment are often too low by a wide margin. Two years will elapse before the MINUTEMAN system becomes operational. There is a good possibility that by this time events will have proved that the cost estimates herein were optimistic.

SOURCES OF INFORMATION

5. The specifications of this weapon system, and most of the numerical cost data and various factors for manipulating it were obtained from the Air Force, as follows:

a. Conference of AFBMD, AFABF, SAC, RAND, and WSEG personnel, 4-7 April 1960.

b. MINUTEMAN Briefing to Air Council and Air Weapons Board, 15-18 February 1960.

c. MINUTEMAN Development Plan, 15 August 1959.

d. Air Force MS-3 Report, October 1959.

e. Tabular materials prepared by AFABF-10 on 29 April 1960 and by AFBMD in July 1960.

6. The figures for only one major item of cost, the missile itself, were derived in WSEG. The WSEG cost estimates for the MINUTEMAN missile are based upon consultations with knowledgeable cost analysts in various organizations.

SYSTEM SPECIFICATIONS

7. The cost estimates in this paper pertain to the MINUTEMAN weapon system essentially as it is described in the 15 August 1959 Development Plan.

8. The main departures from the Development Plan are:

c. Three missiles per train are currently stipulated for the mobile system.

d. A mean-time-to-failure objective of 7000 hours.

9. MINUTEMAN force tabs currently planned by the Air Force are as follows:

TABLE II

CURRENTLY PLANNED MINUTEMAN FORCE TABS

	Number of Deployed Missiles at End of Year		
Fiscal Year	Fixed	Mobile	Total
1961	--	--	--
1962	--	--	--
1963	120	30	150
1964	649	156	805
1965	1225	300	1525
1966	2000	300	2300
1967	2000	300	2300

As of the present, the Ballistic Missiles Committee of OSD has given its approval to the Air Force to initiate production commitments to achieve a force of 150 missiles by the close of FY 1963. Subsequent increments have not yet been approved, nor have the ultimate force objectives received approval from the Administration and the Congress.

DEVELOPMENT OF THE ESTIMATES

10. Classification of Costs. Costs are classified under the following main headings:

a. Research, Development, Test, and Evaluation

b. Industrial Facilities

c. Initial Investment Costs

(1) Major Equipment and Initial Spares (missiles and spare parts).

(2) Support Equipment and Initial Spares (GSE, communications, RR equipment, etc.).

(3) Construction (silos, launch control centers, roads, etc.).

(4) Initial Training

(5) Other (fuel, supplies, etc.).

d. Annual Operating Costs

(1) Personnel

Pay and Allowances

Replacement Training.

(2) Maintenance and Replacement

Missiles

GSE

Communications

RR Equipment

Operational Facilities

(3) Training Missiles

(4) Base Support

(5) Other.

e. Total Program Costs

11. Procedure. In this paper Air Force estimates of RDTE and Industrial Facilities costs as reported in MS-3A of October 1959 are accepted. The pages to follow will present, in detail,

the development of our estimates of the initial investment and annual operating costs of the MINUTEMAN system in both the fixed (hardened and dispersed) and mobile modes. These estimates were arrived at with the cooperation and assistance of the Air Force Director of Budget and the Ballistic Missiles Division. The discussion will proceed item by item in the same order in which the item apears above in the classification of initial investment and annual operating costs.

MAJOR EQUIPMENT AND INITIAL SPARES INVESTMENT

12. The cumulative average price of $743,000 per missile is taken from a cost-quantity curve developed in WSEG and is the price for a total of 2664 missiles through FY 1967. This procurement requirement is based upon the stipulated force schedules, a requirement for an initial training firing by each squadron and train, a proficiency firing program of two missiles per squadron annually, and a requirement for ninety test missiles.

13. The WSEG cost-quantity curve for this missile was derived from information obtained from industry on the costs of the major components; i.e., airframe, propulsion, guidance and control, and re-entry vehicle. The curve is actually a combination of two log-linear curves. The first segment runs through missile 300 and has a 90 percent slope. The formula for this curve is $\log y = 3.34541 - 0.15201 \log x$, where y is the cumulative average price and x is the cumulative missile number. The second segment has a 93 percent slope and the formula is $\log y = 3.22814 - 0.10471 \log x$.

14. According to BMD, initial missile spares are required equivalent to 10 percent of the value of the missile. The total cost of major equipment and initial spares is thus $743,000 per missile plus $74,000 for initial spare parts, a total of $817,000

per missile. This amounts to $40,850,000 per fixed squadron of 50 missiles, and to $2,451,000 per train of three missiles of the mobile system.

SUPPORT EQUIPMENT AND INITIAL SPARES INVESTMENT

15. Silo Equipment (less communications, guidance and control). BMD has supplied cost-quantity data on this equipment for up to 1000 units. Extrapolation of these data to 2000 units yields a figure of $70,000 per missile.

16. Launch Control Center Equipment (less communications, guidance and control). The BMD figure of approximately $5000 per missile for this equipment is derived from the cost-quantity data for LCC number 200, the required number for 2000 missiles.

17. Guidance and Control Equipment. The basis for this estimate is a BMD tabulation on the costs of the mobile system, the cost for the first unit of guidance and control equipment amounting to $1,050,000 per missile. This includes the sequencer-monitor, autocolimator, control consoles, and guidance and control couplers. This equipment, according to AFOOP, is essentially the same for both fixed and mobile systems. Application of a 95 percent cost-quantity curve ($\log y = 3.02119 - 0.07408 \log x$) yields an estimate of $592,000 per missile for the 2300 missiles of the fixed and mobile systems.

18. Strategic Missile Support Area Equipment. The SMSA, located at an existing Air Force base, provides squadron headquarters and support for three squadrons of the fixed system. Maintenance teams and targeting units are based at the SMSA and are equipped with vehicles for performing on-site fault isolation and "tinker-toy" type maintenance at the silos, and for target data insertion, missile rotation, and fuzing. In addition, reentry vehicles and warheads are received at the SMSA, and transported thence to the silos for mating with the missile. Guidance

and control system maintenance is performed at the SMSA. The cost of the equipment for accomplishing these functions is estimated by BMD at $31,000 per missile for the fixed system. Lacking a better figure, $31,000 per missile is also employed in this paper per mobile system missile. It is assumed that personnel, maintenance, and storage facilities existing at the airbase will be adequate and no cost is included for these items.

19. Transporter-Erector for Fixed System. The transporter-erector is a large vehicle for transporting a MINUTEMAN missile, placing it in the silo and withdrawing it from the silo. This vehicle has an all-up weight of 54 tons. BMD estimates the average price of these vehicles, of which 35 are planned for each 1000 missiles, at $60,000 per missile. To this is added an arbitrary 5 percent initial spares factor bringing the total cost per missile to $63,000.

20. RR Equipment - Mobile System. The only RR equipment to be bought consists of the missile launch car, the control car, and the power cars. One launch car, costing about $900,000 according to AFOOP, is of course required for each missile. However, only one control car and two power cars, priced at $380,000 and $450,000 respectively by BMD, are required per three-missile train. The total cost of purchased rail equipment, including a 5 percent initial spares factor, then becomes $1,393,000 per missile. Other equipment, i.e., locomotives, dining cars, sleeping cars, etc., will either be taken from existing surplus military rolling stock or will be rented from the railroads.

21. Communications Equipment - Fixed System. The estimates of the costs of this equipment are taken from the MINUTEMAN Briefing

to the Air Council and Air Weapons Board, 15-18 February 1960. The data are reproduced in Table III.

TABLE III

ESTIMATED COMMUNICATIONS INVESTMENT COSTS PER HARDENED AND DISPERSED SQUADRON

Item	Cost
LCS Data Terminal ($55,000 per silo)	$2,750,000
LCC Data Terminal	650,000
Cable	6,000,000-18,000,000
SAC Command Radio Equipment	354,000
Augmentation of Base Telephone	54,000
Total:	$9,808,000-21,808,000

(N.B. If very low frequency ground wave propagation is successfully developed, communications costs may be in the range of $4-6 million per squadron.) Lacking further evidence, the mid-value of about $15.8 million per squadron or $316,000 per missile is employed here for fixed system communications equipment cost.

22. Communications Equipment - Mobile System. These are estimated by BMD at $217,000 per missile for a three-missile train.

23. Support Equipment Initial Spares. According to BMD personnel, the cost of initial spares for GSE would amount to between 15 percent and 25 percent of the initial investment. A figure of 20 percent is used in this paper, except in the cases of the transporter-erector and railroad equipment as already noted.

CONSTRUCTION INVESTMENT COSTS

24. Silos and Launch Control Centers. BMD has provided a figure of $360,000 for construction of a silo (100 psi) and one tenth (10 missiles per LCC) of a launch control center (500 psi).

25. Roads. It is very difficult to estimate the costs of roads for a typical squadron since terrain features will vary widely and since the frequency of traffic cannot be accurately predicted. Some improvement of existing highways will be required. Based on data pertaining to ATLAS-TITAN squadron road costs, a figure of $100,000 per missile is selected. In addition, an access drive will be built from the highway to the silo, and the cost of this construction is estimated by BMD at $40,000 per missile.

26. Railroad Construction. The Air Force does not currently plan the construction of any sidings but will instead use existing sidings for the pre-surveyed firing sites. There will be no construction of buildings or other installations, except of a trivial nature, at these sidings.

INITIAL TRAINING AND OTHER INVESTMENT

27. Initial Training. This cost is estimated by the Air Force in its MS-3 Report at $72,000 per missile or $9,000 a man. The mobile system requires three times the number of personnel per missile and initial training costs amount to $216,000 per missile on a three-missile train.

28. Other. Initial investment in fuel and miscellaneous supplies is reported at $9,000 per missile in the MS-3 and this figure is also applied to the mobile system.

ANNUAL OPERATING COSTS - PERSONNEL

29. Pay and Allowances. The SAC estimate of $36,000 per missile per year is used for the fixed system and the AFABF figure of $134,000 per missile per year for the mobile system.

30. Replacement Personnel Training. The same sources, SAC and AFABF, provide estimates of $12,000 per missile annually for

fixed missiles and $36,000 per missile annually for mobile missiles. The estimates are based upon an assumption of a 25 percent per year personnel turnover rate and a replacement training cost factor of $6,000 per man.

ANNUAL OPERATING COSTS - RAILROAD RENTALS

31. AFABF estimates the cost of locomotives and car rentals, including RR personnel, at $73,000 per missile per year for the mobile system.

ANNUAL MAINTENANCE AND REPLACEMENT COSTS

32. Missiles. Maintenace costs are estimated by SAC at 15 percent of initial investment per year. Fifteen percent of the $812,000 initial cost is $122,600 per missile and this figure is applied in both the fixed and mobile cases.

33. Ground Support Equipment. SAC estimates that GSE maintenance will cost about 35 percent of the initial investment annually and that GSE replacement will cost about 15 percent of initial investment each year. Investment in fixed-system GSE is $698,000 per missile. Therefore, GSE maintenance and replacement will cost about $349,000 per missile per year. Transporter-erector maintenance and replacement at 20 percent of investment amounts to $12,000 per year bringing the GSE total to $361,000 per missile. Mobile system GSE investment of $623,000 per missile will require an annual maintenance and replacement expenditure of $312,000.

34. Communications Equipment. According to SAC, annual maintenance and replacement of communications equipment will cost about 10 percent of initial investment. This amounts to $32,000 per missile per year for the fixed system and to $22,000 per missile per year for the mobile system.

35. Railroad Equipment. AFABF estimates the fees for maintaining railroad equipment for the mobile system at $72,000 per year.

36. Operational Facilities. Maintenance and replacement of these facilities is estimated by SAC at 5 percent of initial investment per year. In the case of the fixed system, the investment in silos and LCC's is $360,000 per missile and the annual charge amounts to $18,000 per missile annually for these facilities. In the case of the mobile system AFABF provides a figure of $31,000 per missile per year for operational facilities and equipment. No investment is contemplated for mobile system firing site facilities and mobile unit support base facilities are assumed to exist at the host airbase. Maintenance and replacement charges on these facilities, plus similar charges for MUSB (SMSA) equipment purchased for this weapon comprise the $31,000 figure noted above.

ANNUAL TRAINING MISSILE COSTS

37. SAC stipulates that operational squadrons each perform two training firings a year in order to maintain proficiency in the use of the weapon. With 50 missiles per fixed and 30 missiles per mobile squadron, and at a unit price of $817,000 per missile, the annual cost of training firings per squadron amounts to $33,000 and $54,000 on a per-unit equipment missile basis, respectively.

ANNUAL BASE SUPPORT COSTS

38. These costs, covering housing, medical service, transport, etc., are estimated by SAC at $2000 per man annually. This amounts to $16,000 per year per fixed system missile and to $48,000 per mobile system missile.

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TABLE IV

ESTIMATED INITIAL INVESTMENT COSTS FIXED MINUTEMAN SYSTEM[a]

Investment	Thousand $ Per Missile	Source
Major Equipment		
Missiles	743	Weapon Systems Evaluation Group
Initial Spares	74	WSEG Using BMD 10% Spares Factor
Total Major Equipment	817	
Support Equipment		
Silo Equipment Less Guidance and Control	70	BMD Data from AFABF
LCC Equipment Less Guidance and Control	5	BMD Data from AFABF
Guidance and Control	592	BMD Mobile System Tabulation and 95% Curve
SMSA	31	BMD
Communications b/	316	Air Council Briefing
Initial Spares for All Above	203	BMD 20% Spares Factor
Transporter-Erector and Initial Spares	63	BMD Plus 5% Spares Factor
Total Support Equipment	1,280	
Construction		
Silo and LCC	360	BMD
Roads - Highway Improvement c/	100	Bureau of Public Roads and Army Trans. Corps
- Silo Access	40	BMD
Total Construction	500	
Initial Training - Total	72	AF: MS-3
Other - Total	9	AF: MS-3
Total Investment Per Missile	2,678	

a/ These costs are applicable for 100 psi silos and 500 psi LCC's. Preliminary WSEG estimates for a configuration of 300 psi silos and 1000 psi LCC's come to a total investment of $2.78 million per missile.

b/ If ground wave propagation is successful, costs will approximate $1,000,000 per missile.

c/ Based on ATLAS-TITAN experience.

SECRET

TABLE V

ESTIMATED ANNUAL OPERATING COSTS - FIXED MINUTEMAN SYSTEM[a]

Item	Thousand $ Per Missile	Source
Personnel		
Pay and Allowances	36	SAC
Replacement Training	12	SAC
Total Personnel	48	
Maintenance and Replacement		
Missiles (Maintenance only)	123	SAC
GSE	361	SAC
Communications	32	SAC
Operational and SMSA Facilities	18	SAC
Total Maintenance and Replacement	534	
Training Missiles - Total	33	Two Per Sqdn Per Year
Base Support - Total	16	SAC
Other - Total	15	SAC
Total Annual Operating Cost Per Missile	646	

a/ These costs are applicable for 100 psi silos and 500 psi LCC's. Preliminary WSEG estimates for a configuration of 300 psi silos and 1000 psi LCC's come to a total annual operating cost of $0.652 million per missile.

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TABLE VI

ESTIMATED INITIAL INVESTMENT COSTS - MOBILE MINUTEMAN SYSTEM a/

ITEM	Thousand $ Per Missile	Source
Major Equipment		
Missiles	743	WSEG
Initial Spares	74	WSEG Using BMD 10% Spares Factor
Total Majoe Equipment	817	
Railroad Equipment		
Launch Car	900	BMD & AFOOP
Control Car	127	BMD
Power Car	300	BMD
Initial Spares	66	5% Initial Spares Factor
Total Railroad Equipment	1,393	
Support Equipment		
Guidance GSE Control GSE Control Consoles	592	BMD Mobile Tabulation & 95% Curve
Communications Equipment	217	BMD
SMSA Equipment	31	BMD
Initial Spares for Above	168	BMD 20% Spares Factor
Total Support Equipment	1,008	
Initial Training - Total	216	AF: MS-3 Factor
Other - Total	9	AF: MS-3
TOTAL INVESTMENT PER MISSILE	3,443	

a/ Three missiles per train.

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TABLE VII

ESTIMATED ANNUAL OPERATING COSTS MOBILE MINUTEMAN SYSTEM a/

ITEM	Thousand $ Per Missile	Source
Personnel		
Pay & Allowances	134	AFABF
Replacement Training	36	AFABF
Total Personnel	170	
RR Fees - Total	73	AFABF
Maintenance & Replacement		
Missiles	123	SAC 15% Factor
GSE	312	SAC 35% + 15% Factor
Communications	22	SAC 10% Factor
RR Equipment	72	AFABF
Facilities & Equipment	31	AFABF
Total Maintenance & Replacement	560	
Training Missiles - Total	54	WSEG at 2/Sqdn/yr
Base Support - Total	48	AFABF
Other - Total	19	AFABF
TOTAL ANNUAL OP. COST PER MISSILE	924	

a/ Three missiles per train.

OTHER ANNUAL OPERATING COSTS

39. Other annual operating costs are incurred for fuel, supplies, transportation of missiles, and services of technical representatives. For the fixed system, these costs are estimated by SAC at $15,000 per missile annually. In the case of the mobile system, these costs are estimated by AFABF at $19,000 annually.

TABULAR SUMMATION OF INVESTMENT AND OPERATING COSTS

40. The foregoing material is summarized in the following tables:

a. Table IV - Estimated Initial Investment Costs - Fixed MINUTEMAN System.

b. Table V - Estimated Annual Operating Costs - Fixed MINUTEMAN System.

c. Table VI - Estimated Initial Investment Costs - Mobile MINUTEMAN System.

d. Table VII - Estimated Annual Operating Costs - Mobile MINUTEMAN System.

ESTIMATES OF TOTAL PROGRAM FUNDING

41. Using the estimates developed here for initial investment and annual operating costs, and Air Force estimates of RDTE and Industrial Facilities costs, figures on total program funding have been derived and appear in Table VIII below.

TABLE VIII

ESTIMATES OF TOTAL PROGRAM FUNDING FOR MINUTEMAN: FY 1961-67
(Millions of Dollars)

Fiscal Year	RDTE Funds	Industrial Facility Funds and Other	Investment Funds			Operating Funds			Total Funds
			Fixed System	Mobile System	Total	Fixed System	Mobile System	Total	
1961	312	41	128	41	169	-	-	-	522
1962	265	5	727	226	953	-	-	-	1223
1963	143	12	1358	425	1783	39	14	53	1991
1964	87	15	1744	291	2035	249	86	335	2472
1965	30	8	1191	50	1241	605	211	816	2095
1966	-	-	208	-	208	1041	277	1318	1526
1967	-	-	-	-	-	1292	277	1569	1569
TOTAL	837	81	5356	1033	6389	3226	865	4091	11398

APPENDIX "C" TO ENCLOSURE "F"

ESTIMATED COSTS OF THE POLARIS WEAPON SYSTEM

APPENDIX "C" TO ENCLOSURE "F"

ESTIMATED COSTS OF THE POLARIS WEAPON SYSTEM

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APPENDIX "C" TO ENCLOSURE "F"

ESTIMATED COSTS OF THE POLARIS WEAPON SYSTEM

PURPOSE

1. To evaluate the latest available estimates of the costs of the POLARIS FBM/SSBN weapon system, and to furnish estimates of the cost of proposed POLARIS Cruiser programs. Estimates for POLARIS installations on cruisers are given in Annex "B" to this Appendix.

SUMMARY OF ESTIMATES

2. Total programmed obligations through Fiscal Year 1967, to achieve an operational force of 45 SSBN's equipped with POLARIS missiles are estimated at $12.4 billion according to official CNO estimates dated 27 April 1960. This total is about 57 percent higher than a similar estimate for the same force level and time period prepared by the same office in June 1959. Comparative data are given in Table I.

TABLE I

COMPARISON OF ESTIMATES OF POLARIS SYSTEM COSTS FOR 45 SSBN FORCE THROUGH FY 1967

	Special Projects Office (30 June 59)[a] (Millions)	MS-3/2A and Supplements (April-July 60) (Millions)	Increase Millions	Increase Percent
RDT&E and Related Procurement	$1,867	$3,225	$1,358	73
Submarines (45)	4,128	4,749	621	15
Missiles	538	2,032	1,494	278
Tenders	292	379	87	30
Industrial Facilities	112	154	42	38
Military Construction	129	145	16	12
Other Investment	--	342	342	--
Maintenance and Operations	610	1,124	514	84
Military Personnel	189	210	21	11
TOTAL	$7,865	$12,360	$4,495	57

[a] Submitted by SPO for use in WSEG Report No. 23, Second Annual Review.

3. Differences between certain cost elements are due in part to differences in the classification of costs, but the comparison

of totals for the entire system is valid. Most of the increase can be explained by: (1) a considerable increase in development costs mainly attributable to the A-3 missile, (2) revision of unit costs for both submarines and missiles, and (3) addition of 729 A-2 and A-3 missiles to replace all of the A-1's by 1964 and all of the A-2's by FY 1968.

4. The current funding schedules reported in this paper appear to be realistic and complete, and with one minor exception they cover all development, investment, and operating expenses for all facilities and activities which are uniquely associated with the POLARIS program. The only exception is the exclusion of military pay for crews of the two test ships (see paragraph 14).

5. The latest estimates of programmed obligations by fiscal years through 1967 are summarized in Table II. Obligations for RDT&E and investment, through the fiscal year 1960, account for about 22 percent of the nonrecurring costs required to establish an operational capability with A-3 missiles in 45 submarines. Operating costs, of course, rise steadily, reaching a peak at a little more than $400 million per year by 1967.

TABLE II

PROGRAMMED OBLIGATIONS FOR POLARIS WEAPON SYSTEM, BY FISCAL YEARS THROUGH 1967 a/

	Millions of Dollars			
Fiscal Year	RDT&E	Investment	Operating	Total
1957 & Prior	$113.9	$ 14.7	0	$128.6
1958	196.2	241.5	0.5	438.2
1959	389.8	601.6	7.5	998.9
1960	398.6	518.9	12.4	929.9
Subtotal:	$1,098.5	$1,376.7	$ 20.4	$2,495.6
1961	485.4	724.9	46.0	1,256.3
1962	602.3	1,174.2	80.6	1,857.1
1963	532.6	1,627.1	104.7	2,264.4
1964	247.0	1,648.0	149.0	2,044.0
1965	128.1	713.8	208.0	1,049.9
1966	74.7	459.0	316.7	850.4
1967	56.8	76.8	408.4	542.0
Total:	$3,225.4	$7,800.5	$1,333.8	$12,359.7

a/ U.S. Navy, CNO, MS-3/2A Form, 27 April 1960. RDT&E funds include "Procurement for DT&E." Operating funds include "Operation and Maintenance" and "Military Personnel."

6. Programmed force levels and total costs for the principal elements of this system by fiscal years through 1967, are presented in Table I of Appendix "A". The principal elements of cost (excluding warheads) through FY 1967 in millions of dollars, are as follows:

a. RDT&E and Related Procurement		$3,225
b. Initial Investment:		
(1) Submarines (45)	$4,749	
(2) Tenders (6)	379	
(3) Missiles (1,734)	2,032	
(4) Other equipment	342	
(5) Facilities	299	7,801
c. Operating Costs:		
(1) Operation and maintenance	$1,124	
(2) Military personnel	210	1,334
Total costs:		$12,360

7. This program provides for outfitting the submarines initially and after each overhaul period with the most advanced missile then available. This generates a requirement for three sets of missiles (A-1, A-2, and A-3) for each of the first 7 submarines, two sets of missiles (A-2 and A-3) for each of the next 19 submarines, and one set of missiles (A-3) for the last 19 submarines. By the end of FY 1964, all of the A-1 missiles will have been retired and all of the 14 submarines operational at that time will be equipped with A-2 missiles. By the end of FY 1968, all of the 45 submarines will have A-3 missiles. Altogether, a total of 1,940 POLARIS missiles will be procured as follows:

Flight test missiles		206
Shipfill, shakedown, support, and replacement:		
A-1 . . .	159	
A-2 . . .	570	
A-3 . . .	1005	1,734
Total Missiles		1,940

8. The above costs exclude warheads, but they include the initial cost of reactor cores for the nuclear ship propulsion system and the cost of replacing the expended nuclear fuel materials.

9. Total development and investment costs from the inception of the program through the Fiscal Year 1967, and average costs per submarine and per shipfill missile, are therefore as follows:

	Millions of Dollars		
	Total Costs	Average Per SSBN	Average Per Missile
RDT&E	$ 3,225	71.7	4.5
Initial Investment (excl. of WH)[1/]	7,801	173.3	10.8
Total[1/]	$11,026	245.0	15.3

10. By the end of FY 1967 all of the submarines, tenders, and supporting facilities should be fully operational. The cumulative number of SSBN years should then be 126.1, and the cumulative cost of operations for the entire system will amount to $1,334 million (see Table I, Annex "A"). Dividing this total by the total SSBN years, the average annual operating cost per submarine is $10.6 million or about $661 thousand per shipfill missile.

INVESTMENT COSTS PER UNIT

11. Initial investment costs per SSBN, as reported by the Special Projects Office on 7 April 1960, are given below in Table III. These costs exclude warheads, RDT&E, and the cost of 729 A-2 and A-3 missiles for replacement of A-1's and A-2's. Also excluded (since they are considered as part of RDT&E) are the conversion and outfitting costs of the two EAG test ships and the three oceanographic survey vessels.

1/ Includes investment in industrial and development facilities.

TABLE III

POLARIS SYSTEM INVESTMENT COSTS PER SSBN FY 1967
AS REPORTED BY SPECIAL PROJECTS OFFICE

Item	Millions of Dollars
Major Equipment - SSBN's	$ 105.4
Shipfill Missiles	18.8
Shakedown and Support Missiles (6-1/3)	7.4
Other Equipment (including initial spares)	13.6
Personnel Transitional Training	0.3
Initial Ammo, Fuel and Supplies	a/
Site Acquisition and Base Construction	8.4
Total Initial Investment Cost	153.9

a/ Included in "Major Equipment - SSBN's."

12. The cost of replacement missiles must be included in POLARIS costs if the system is to be credited with the progressive improvement in effectiveness represented by the increases in range from [redacted] Replacement missile costs have in fact been included by the Special Projects Office in the programmed obligations summarized above in paragraphs 5 and 6, and given on Table I, Annex "A". The total cost of the replacement missiles is estimated at $873 million or about $19 million per SSBN. This amount, added to the $154 million per SSBN given above in Table III, brings the total initial investment per submarine up to $173 million, which is now consistent with the investment cost per submarine shown in paragraph 9.

OPERATING COSTS PER UNIT

13. The annual operating costs per submarine, as reported by the Special Projects office are given in Table IV.

TABLE IV

POLARIS SYSTEM OPERATING COSTS PER SSBN IN FY 1961 AND FY 1967, AS REPORTED BY SPECIAL PROJECTS OFFICE

Item	Millions of Dollars FY 1961	FY 1967
Personnel Pay and Allowances (SSBN only)	$ 1.1	$ 1.1
Replacement Personnel Training	0.2	0.2
Replacement of Equipment	2.5	5.1
Maintenance of Equipment	2.3	1.2
Replacement and Maintenance of Facilities	1.2	0.7
Replenishment of Ammunition, Fuel and Supplies	$ 0.9	$ 1.0
Total Operating Costs:	$ 8.2	$ 9.3

14. The item "Personnel Pay and Allowances" in Table IV amounting to $1.1 million per SSBN includes only the submarine crews. Other personnel uniquely associated with the POLARIS system are the tender crews and personnel at the Naval Weapons Annexes.[1/] The total cost of military personnel in FY 1967, reported on MS-3.2A forms, amounts to $66.9 million. This total, divided by the 43.2 SSBN's in that year (see Table I, Annex "A"), gives us an average of $1.54 million per SSBN-year, or $0.4 million more than in Table IV.

15. O&M costs, excluding personnel pay and allowances but including maintenance, repair, overhaul, fuel, supplies, replacement of equipment (except missiles), replacement training, etc., amount to $8.2 million per SSBN in FY 1967 according to Table IV. The total for Operation and Maintenance given in MS-3.2A for 1967 (see Table I, Annex "A") is $341.5 million for the system, or $7.91 million per SSBN-year.

1/ It should be noted that O&M costs associated with the EAG test ships and AGS survey vessels are included by Special Projects Office in POLARIS funds for RDT&E or related procurement, but military personnel pay and allowances for crews of the two test ships are not included in any of the POLARIS accounts. These ships are required only in the FBM development program and do not represent a recurring cost to the system. Each of the two EAG test ships has a crew of about 100 officers and enlisted men, and their average annual pay and allowances amount to about $0.5 million per ship.

16. The minor differences between the derived and reported operating costs are relatively unimportant and can be explained by differences in the definition of costs in MS-3.2A and MS-3.2B forms. We conclude that the best estimate of operating costs per SSBN per year will amount to about $10 million when the system is fully operational, and that the average annual operating cost per shipfill missile will be about $625,000, or about 11 percent more than the reported estimate for FY 1967 as given in Table IV.

SHIPBUILDING AND CONVERSION COSTS

17. Forty-five nuclear submarines, six tenders, two EAG test ships, and three survey ships are financed by the POLARIS program. In the programmed obligations schedule given in Table I of Annex "A", the cost of submarine construction and tender conversion or construction is accounted for by investment funds, while the conversion costs for the two EAG test vessels and the three AGS survey ships are in RDT&E or related procurement.

18. Investment in submarines represents the most costly part of this system, accounting for $4,749 million or 38.4 percent of total programmed obligations through FY 1967. Included in the cost of submarines and tenders is an allowance for price inflation amounting to $443 million or about 8.6 percent of the total for both types of vessels. Submarine funds also include about $146 million which should be considered as research and development expense since development costs are charged to the lead ships of each class.

19. The latest cost estimates for submarines are as presented in Table V.

TABLE V

CONSTRUCTION AND OUTFITTING COSTS FOR 45 POLARIS SSBN

Number and Name	Thousands of Dollars
SSBN 598, George Washington	$ 180,429
SSBN 599, Patrick Henry	104,501
SSBN 600, Theodore Roosevelt	106,570
SSBN 601, Robert E. Lee	105,045
SSBN 602, Abraham Lincoln	102,786
SSBN 608, Ethan Allen	152,305
SSBN 609, Sam Houston	93,965
SSBN 610, Thomas A. Edison	99,158
SSBN 611, John Marshall	94,241
No. 10	116,400
No. 11	106,000
No. 12	106,000
Subtotal	$1,367,400
Plus 33 SSBN @ $102,475	3,381,600
TOTAL 45 SSBN	$4,749,000

20. The average cost per submarine for the first 9 "follow-on" ships (excluding #598, #608 and #10) amounts to $102,030 thousand. The principal elements of cost comprising this average are as follows:

	Thousands	Percent of Total
Ship construction	$ 69,533	68.1
Navigation	13,014	12.8
Fire control	7,974	7.8
Launching and handling	5,841	5.7
Missile checkout	2,855	2.8
Torpedo fire control	1,926	1.9
Test instrumentation	577	0.6
Training and technical direction	310	0.3
TOTAL	$102,030	100.0

21. In a ship construction program of this magnitude we would expect to find some reduction in unit costs at each shipyard in accordance with normal learning curves for the manufacture of military equipment. This, of course, assumes no major changes in design. Since the estimate of unit costs for the last 33 SSBN's is almost the same as the average for the first 9 "follow-on" submarines, it may be concluded that the allowance for price inflation has cancelled out at least part of the potential savings from large-scale production.

22. Table VI presents shipbuilding and conversion costs, including equipment, for 11 surface ships associated with the POLARIS program.

TABLE VI

SHIP CONSTRUCTION OR CONVERSION AND OUTFITTING COSTS FOR ELEVEN SURFACE SHIPS ASSOCIATED WITH THE POLARIS PROGRAM

SHIP	Thousands of Dollars
EAG-153, Compass Island (Conversion)	$ 19,600
EAG-154, Observation Island (Conversion)	72,800
T-AGS-21, USNS Bowditch (Conversion)	9,784
T-AGS-22, USNS Dutton (Conversion)	9,573
T-AGS-23, USNS Mickelson (Conversion)	10,343
AS-19, USS Proteus - Tender (Conversion)	33,200
AS-31, Tender (New Construction)	72,500
AS-3, Tender (New Construction) AS-4, Tender (New Construction) AS-5, Tender (New Construction) AS-6, Tender (New Construction)	273,500
Total for 11 Ships:	$ 501,300

23. The ready-for-sea schedule for all POLARIS submarines and ships is presented in Table II, Annex "A".

ESTIMATES OF MISSILE COSTS

24. The total cost of 1,734 POLARIS missiles required for shipfill, replacement, shakedown, and support amounts to $2,032 million, or 16.4 percent of the total programmed obligations through FY 1967. These funds include spare parts, accounting for about 11 percent of the total missile cost.

25. The procurement schedule for missiles by type and programmed obligations through 1967 are shown in Table VII.

TABLE VII

NUMBER AND COST OF POLARIS MISSILES FOR SHIPFILL, SHAKEDOWN AND SUPPORT

Fiscal Year	Number of Missiles A-1	A-2	A-3	Total	Programmed Obligations (Millions)	Average Cost Per Missile (Thousands)
1960 & Prior	134	0	0	134	$187.5	$1,399
1961	25	34	0	59	81.7	1,385
1962	0	184	0	184	197.2	1,072
1963	0	318	0	318	285.1	897
1964	0	34	301	335	435.2	1,299
1965	0	0	352	352	420.2	1,194
1966	0	0	318	318	369.2	1,161
1967	0	0	34	34	55.4	1,629
TOTAL	159	570	1,005	1,734	2,031.5	1,172

26. The average cost per missile in the preceding table tends to fluctuate over the period--first falling then rising--because it is actually a composite of averages for three distinct types of missiles, differing in range, gross weight, and unit costs. Table VIII presents unit costs separately for each of the three types.

SECRET

TABLE VIII

ESTIMATES OF POLARIS MISSILE COSTS BY TYPE

	Number of Missiles		Total Cost of Missiles ($ Millions)		Average Cost Per Missile ($ Thousands)	
	In Each Block	Cumulative	In Each Block	Cumulative	In Each Block	Cumulative
A-1 Missiles:						
Range: Gross Wt: 28,600 lbs.	(159 missiles costed at a lump sum of $235.8 million; average per missile = $1,483 thousand)					
A-2 Missiles:						
Range: Gross Wt: 33,225 lbs.	79	79	$107.3	$107.3	$1,358	$1,358
	45	124	55.0	162.3	1,223	1,309
	91	215	100.1	262.4	1,100	1,220
	181	396	179.2	441.6	990	1,115
	174	570	154.9	596.5	890	1,046
A-3 Missiles:						
Range: Gross Wt: 34,830	50	50	82.0	82.0	1,640	1,640
	100	150	147.6	229.6	1,476	1,531
	150	300	198.8	428.4	1,325	1,428
	300	600	358.8	787.2	1,196	1,312
	405	1005	458.9	1246.1	1,133	1,240

OTHER POLARIS FACILITIES

27. Programmed funds for this system finance a great many military and industrial facilities used in the development, production, maintenance, and operation of the submarines and missiles. The most important of these are as follows:

a. Submerged launch test facilities, San Clemente Island, California.

b. AFMTC facilities for POLARIS tests, Cape Canaveral, Florida.

c. Aerojet plant, Sacramento, California.

d. Lockheed plant, Sunnyvale, California.

e. Hypervelocity gun range.

f. Navigation test facility

g. Surface-current experimental facility

h. Three submarine overhaul facilities

i. Two missile assembly facilities

j. Three FBM training facilities

[redacted]

n. Graving dock, Charleston, S. C.

28. Some of these facilities are obviously useful only in the development and testing of operational POLARIS equipment, thus representing nonrecurring costs which are independent of the size of the force. Some installations, such as VLF and HARE stations, are shared with other Navy systems. Other facilities are clearly associated with POLARIS/SSBN maintenance and operation, so that their costs would tend to vary with the number of units in operation. In general, the construction or expansion of all of these facilities is financed by the Military Construction (MCON)

account, while procurement of their equipment may be covered either by the same funds or in Procurement of Aircraft and Missiles (PAMN), or Other Procurement, Navy (OPN).

29. Most of the initial costs of these facilities are covered by the following accounts, given by year in Table I of Annex "A".

	Total Initial Cost Through FY 1967 (Millions)
a. Industrial facilities (except equipment)	$ 153.6
b. Development facilities (MCON only)	28.0
c. Operations and other facilities (MCON only)	117.2
d. Equipment other than ships and missiles	342.0
Total above items:	$ 640.8

30. Although records currently available within WSEG do not reveal the amounts attributable to each of the 14 items listed above in paragraph 27, it is possible to show the approximate cost of seven of them from details given in the latest POLARIS budget for FY 1961.[1/] Total funds available through that year, in thousands of dollars, are as follows:

a. Submerged launch test facility (MCON)	$ 2,265
b. AFMTC facilities for POLARIS (MCON)	21,601
c. Aerojet plant:	
(1) Expansion (MCON)	5,750
(2) Equipment (PAMN)	26,630
d. Lockheed plant:	
(1) Expansion (MCON)	9,938
(2) Equipment (PAMN)	28,300
e. Submarine overhaul facility, Charleston, S. C. (MCON)	2,355
f. Missile assembly facility, Charleston, S.C.:	

1/ From POLARIS Fiscal Year 1961 Budget, submitted by the Special Projects Office, 1 February 1960.

(1) Construction (MCON)	11,025
(2) Equipment (PAMN)	21,074
g. VLF, Maine (MCON)	49,133

SSBN OPERATING CYCLE AND MISSILE FAILURE RATE

[redacted]

33. The above information was received 1 July 1960 [1] by WSEG in response to a question submitted to the Special Project Office. The exact text of the SPO's statement is as follows:

"The operating cycle used in developing the costs was as follows:

		Sea		O'Haul		Sea		O'Haul
598 Class SSBN	1st	30M	-	6	-	30	-	10
	Later	35	-	4	-	35	-	10
608 Class		35	-	4	-	35	-	10

While at sea the SSBN's spend 60 days on patrol and 30 days at tender, of which one week is at sea for pre-patrol refresher training and can be considered patrolling. Percent of time on station for one complete cycle is therefore $\frac{(35+35)}{(35+4+35+10)} \times \frac{(60+7)}{(90)} \times 100$

= 62%

[redacted]

1/ See Memorandum for the Director, Weapons Systems Evaluation Group; (Op-723/nc, Ser 00276P72, 1 July 1960).

ANNEX "A" TO APPENDIX "C"

POLARIS FORCE LEVELS, PROGRAMMED OBLIGATIONS, AND READY-FOR-SEA SCHEDULE

TABLE I

POLARIS WEAPON SYSTEM FORCE LEVELS
AND PROGRAMMED OBLIGATIONS BY
FISCAL YEARS THROUGH 1967

TABLE I

POLARIS WEAPON SYSTEM FORCE LEVELS AND PROGRAMMED OBLIGATIONS BY FISCAL YEARS THROUGH 1967

ITEM	FY 1960 and Prior Years	FY 1961	FY 1962	FY 1963	FY 1964	FY 1965	FY 1966	FY 1967	Total Through 1967	FY 1968
A. OPERATIONAL FORCES										
1. SSBN's ready for sea at End of Year	1	5	7	10	14	26	38	45		45
2. Average SSBN's During Each Year [a/]	0.1	3.0	5.9	8.9	12.0	20.5	32.5	43.2	126.1	45.0
3. Number of Missiles (Shipfill, Replacement, Shakedown and Support) Procured Each Year	134	59	184	318	335	352	318	34	1,734	-
4. Number of Operational Missiles, Including Shipfill and Support:										
A-1	21	107	139	109	-	-	-	-	-	-
A-2	-	-	8	104	299	544	426	187	-	-
A-3	-	-	-	-	-	8	385	773	-	960
TOTAL	21	107	147	213	299	552	810	960		960
B. PROGRAMMED OBLIGATIONS (Millions Of Dollars)										
1. RDT&E (Incl. Procurement for DT&E)	1,098.5	485.4	602.3	532.6	247.0	128.1	74.7	56.8	3,225.4	NA
2. Investment:										
a. SSBM	903.9	535.4	851.3	1,168.7	1,033.7	206.7	41.3	8.0	4,749.0	NA
b. Tenders	65.1	19.2	61.8	128.4	83.7	16.8	3.3	0.9	379.2	NA
c. Missiles Except Flight Test and Evaluation	187.5	81.7	197.2	285.1	435.2	420.2	369.2	53.4	2,031.5	NA
d. Other Equipment	55.4	48.8	31.0	30.2	86.1	46.3	37.0	7.2	342.0	NA
e. Industrial Facilities	74.2	25.3	16.0	10.0	5.0	14.0	6.0	3.1	153.6	NA
f. Development Facilities	22.6	2.2	1.0	0.9	0.4	0.4	0.3	0.2	28.0	NA
g. Operations and Other Facilities	68.0	12.3	15.9	3.8	3.9	9.4	1.9	2.0	117.2	NA
TOTAL	1,376.7	724.9	1,174.2	1,627.1	1,648.0	713.8	459.0	76.8	7,800.5	NA
3. Operating Costs:										
a. Operation and Maintenance	19.8	38.8	70.4	88.2	128.5	173.3	263.4	341.5	1,123.9	NA
b. Military Personnel	0.6	7.2	10.2	16.5	20.5	34.7	53.3	66.9	209.9	NA
Total O&M Mil. Personnel	20.4	46.0	80.6	104.7	149.0	208.0	316.7	408.4	1,333.8	NA
TOTAL Programmed Obligations	2,495.6	1,256.3	1,857.1	2,264.4	2,044.0	1,049.9	850.0	542.0	12,359.7	NA

Source: U.S. Navy, Special Projects Office.

a/ Based on Ready for Sea Schedule given in Table II of this Appendix.

TABLE II

POLARIS PROGRAM READY-FOR-SEA SCHEDULE

Ship	RFS Date	Ship	RFS Date	Ship	RFS Date
EAG#154	12/58	SSBN #15	7/64	SSBN #35	3/66
ENS # 1	10/58	" 16	8/64	" 36	4/66
" 2	11/58	" 17	9/64	" 37	5/66
" 3	12/58	" 18	10/64	" 38	6/66
SSBN#598	6/60	" 19	11/64	" 39	7/66
" 599	8/60	" 20	12/64	" 40	8/66
" 600	1/61	" 21	1/65	" 41	9/66
" 601	2/61	" 22	2/65	" 42	10/66
" 602	5/61	" 23	3/65	" 43	11/66
" 608	11/61	" 24	4/65	" 44	12/66
" 609	4/62	" 25	5/65	" 45	1/67
" 610	8/62	" 26	6/65	AS # 3	10/64
" 611	10/62	" 27	7/65	" 4	10/65
AS # 19	10/60	" 28	8/65	" 5	12/65
" 31	10/62	" 29	9/65	" 6	10/66
SSBN # 10	4/63	" 30	10/65	"	
" 11	8/63	" 31	11/65		
" 12	10/63	" 32	12/65	(See Table I, Annex "A", for SSBN years)	
" 13	4/64	" 33	1/66		
" 14	6/64	" 34	2/66		

NOTE: According to the Special Projects Office the above schedule is predicated on a FY 1961 building program of three SSBN's being fully funded and the procurement of long lead items for nine more to be fully funded in FY 1962. If the 5 by 7 FY 61 program, as agreed to by the House and Senate Committees, is approved for implementation, the RFS dates would be as follows:

SSBN's #1-9 - the same as given above
#10 - February 1963
#11 - April 1963
#12 - August 1963
#13 - November 1963
#14 - January 1964
#15 to # 23 - one per month March-November 1964
#24 and subsequent - one per month commencing February 1965.

This accelerated schedule would result in the following average SSBN years for the period through 1967.

FY	SSBN-Years	FY	SSBN-Years
1960	0.1	1965	23.4
1961	3.0	1966	34.5
1962	5.9	1967	44.2
1963	9.3		
1964	13.9	Total through FY'67	134.3

ANNEX "B" TO APPENDIX "C"

ESTIMATED COST OF POLARIS CRUISERS

ANNEX "B" TO APPENDIX "C"

ESTIMATED COST OF POLARIS CRUISERS

1. Estimates presented here are based on data previously reported by the Navy for use in WSEG Report No. 47, Evaluation of the POLARIS Cruiser System, 1 June 1960,[1] modified to reflect more recent data on costs of POLARIS missiles as given in the preceding portions of this Appendix.

2. [redacted]

[redacted] It is important to note that in each case only those costs directly attributable to the POLARIS missile augmentation are given (including costs of alteration of the ship and installation of support equipment for the system), since other modification or construction and operating costs attributable to the basic cruiser and to its other weapon systems are assumed to be funded under other programs.

3. Construction of the CG(N) LONG BEACH and conversion of the four CG's has already been authorized and funded, with the exception of the POLARIS installation. Based on present scheduling, it appears that at least two FBM installations could be completed sometime in 1963, and that all five could be equipped for deployment by mid-1965.

4. Conversion of CA's, including installation of the FBM system would require twenty-four months, but scheduling of these conversions presents less of a problem inasmuch as the initial ships could be cruisers from the reserve fleet. Present estimates are that the first of these ships could be available by about February 1963, 3 ships could be completed by mid-1963,

1/ The costs of POLARIS installations on cruisers, reported by the Navy in October 1959 and used in WSEG Report No. 47, do not include any allowance for price inflation similar to that included in the costs of POLARIS submarines and tenders (see paragraph 18, page 65).

TABLE I

INCREMENTAL COST OF POLARIS CRUISER SYSTEMS
EXCLUDING WARHEADS
(Millions of Dollars)

Item	1 CG(N) and 4 CG's, each	12 CA's, each with
1. Incremental Investment Cost Attributable to POLARIS		
a. Cost of installing POLARIS equipment[a]	183.8	564.0
b. Cost of POLARIS missiles[b]		
(1) Shipfill missiles	41.8	200.8
(2) Pipeline and shakedown	18.8	79.5
c. Expansion of Naval Weapons Annex	0.2	5.0
d. Personnel training	0.3	0.6
e. Total incremental investment	244.9	849.9
Average cost per ship	49.0	70.8
Average cost per missile	6.12	4.43
2. Annual Operating Cost Attributable to POLARIS		
a. Personnel pay and allowances, including replacement training	1.3	3.1
b. POLARIS equipment maintenance	3.7	9.0
c. Missile replacement[b] and training	15.7	68.2
d. Base maintenance and replacement	0.1	0.7
e. Total annual operating cost	20.8	81.0
Average cost per ship	4.2	6.8
Average cost per missile	0.52	0.42

a/ Excludes $0.2 million of RDT&E costs for the 5-ship system and $24.0 million for the 12-ship system.

b/ The initial shipfill is assumed to comprise A-2 missiles in each case, costing an average of $1.046 million per unit. Replacement missile costs, as first reported by the Navy for use in WSEG Report No. 47, were based on a shelf life of 5 years, thus averaging 20 percent of the shipfill per year. In this study it is assumed that replacement would be at the same rate, but that A-3 missiles, averaging $1.24 million per unit, would be available for replacement.

and a total of 12 ships could be available for deployment by mid-1964. However, funds have not been approved either for conversion to CG or for the installation of the POLARIS system.

5. The POLARIS-Cruiser programs are assumed to be additional to the plan for 45 SSBN's. Implementation of the CG and CA cruiser programs would require the procurement of 2,292 missiles, excluding those for RDT&E, as follows:

45 SSBN program	1,734
17 Cruisers (with A-2 shipfill missiles replaced by A-3's in five years)	558
Total missiles	2,292

6. The estimated total cost of construction and outfitting of the CG(N) and the total cost of converting the other 4 CG's, including supporting equipment but excluding missiles, according to the Navy, is as follows:

	Millions of Dollars
CG(N)-9 Construction	300
CG-10 Conversion	168
CG-11 Conversion	164
CG-12 Conversion	139
CG-13 Conversion	152
Total five ships	923

As shown above in Table I, however, only $184 million of the $923 million is directly attributable to POLARIS equipment. The balance of the cost is attributable to other weapon systems, including TALOS, ASROC, TARTAR or TERRIER, new communications, Naval Tactical Data System (NTDS), and rehabilitation.

END OF TOP SECRET JUNE 1971

1. Following the internal political events of 18 March 1970 in Cambodia and the Presidential Determination of 22 April 1970 to assist the Government of Cambodia in its struggle to maintain its independance, U. S. assistance commanded with the delivery of individual weapons, ammunition and uniforms. These items were delivered on an irregular and unscheduled basis and, to the extent possible at the time, were coordinated by MACV and the U. S. Embassy, Phnom Penh.

2. With the 22 May announcement of a $7.0 million MAP for Cambodia, the Secretary of Defense provided guidelines and constraints as follows:

a. Partial support for force of 55,000 which would not include high cost sophisticated items such as tanks and aircraft.

b. Key the program to the existing Cambodian military structure and equipment.

c. Ground forces should be developed as lightly armed infantry supported by 60MM and 81MM mortars and 105MM howitzers with limited mobility provided by trucks, armored cars and light tanks already in the Cambodian Armed Forces inventory.

d. Only T-28 aircraft to be supported.

e. Limit Naval support to small patrol craft.

f. Provide minimum munitions stock levels for U. S. type weapons and T-28 aircraft.

g. Provide air/ground and other communications equipment for current operations.

3. MACV organized the Special Support Group (SSG) within the MACV J-4 section. The responsibilities of the SSG were to organize and manage the out-of-country aspects of the $7.0 million program for military assistance to Cambodia.

4. In mid-June, the office of the Political/Military Counselor was established in the U.S. Embassy, Phnom Penh with the responsibility for incountry management of the Cambodia MAP. During the early days of its existance, the POL/MIL office relied almost entirely upon the members of the Defense Attache Office for the operation of the program.

5. On 30 January the Military Equipment Delivery Team, Cambodia was activated. This team consisted of 50 personnel, 16 of which were stationed in Cambodia, attached to the American Embassy and working under policy guidance provided by the Ambassador. Technical guidance and operational direction was provided by the Chief, MAAG located in Vietnam.

6. The 16 personnel authorized to be incountry were generally obtained from MACV assests and on relative short notice were located incountry. Upon arrival

the immediate task was to quickly gain a detailed knowledge of the Armed Forces organization and capabilities. Based on this initial survey the FY71 MAP ($65 million plus $20 million of military related aid) would be shipped into country and distributed. The three priorities were:

a. Train and equip combat forces.

b. Develop and equip a logistics base.

c. Establish a schools system that would sustain both priority 1 and 2.

7. On 24 May 1971 an agreement was reached to increase the incountry team to 23 spaces. A copy of the resultant reorganization is attached at Tab A.

FORCE STRUCTURE:

1. FANK organizations have been based on French concepts that have proven increasingly cumbersome for the type of war being fought in Cambodia. The basic combat element was the battalion, some of which were separate and others formed into brigades. The basic organizational structure consisted of two broad catagories. Those forces that were directly under the control of the General Staff for operations throughout Cambodia and are principally used to execute General Lon Nol's offensive strategy for the eventual expulsion of the communists. The second category known as Regional Forces are those forces that belong to the Regional Commander. In many cases they are recruited, trained and partially equipped by the Regional Commander. They are used as he sees fit to clear his region of the enemy, protect routes and bridges and provide security as necessary for the passage of General Reserve Units through his region. On some occasions, General Reserve Units will be assigned to regions for specific operations.

2. With the sudden growth of FANK through recruitment of volunteers the organization became increasingly difficult to control. There was a proliferation of units of strengths unknown even to the general staff and an increasing activity in an area which can be categorized as paramilitary forces. This stemmed from General Lon Nol's reluctance to refuse any offer of help from the populace based probably on a fear of blunting their enthusiasm.

3. From the point of view of the MAP it became increasingly difficult to insure that MAP supported units were receiving the equipment destined for them. As the size of FANK grew the need for arms and ammunition increased and the stream of MAP arms was being dispersed into an ever increasing pool of requirements. Consequently, in April 1971, the Ambassador presented a letter to the President of the Council of Ministers asking: (1) That recruitment cease, (2) That FANK make an accurate count of personnel within Cambodia the U.S. was prepared to support a total force of 220,000 men by the end of FY72 and, (3) that FANK should develop a force structure reflecting the above strength.

4. The FANK General Staff responded by developing a General reserve of 14 Infantry Brigades, 2 para brigades, and 1 each armor, artillery, engineer, signal and transportation brigade plus an MP force of 5,500 man. For the basic unit, with battalion, in some regions, being allocated to the MR Commander as his reserve and in one region a brigade. Overall strengths were set for each region within which the MR Commander had to reduce or increase his present strength.