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Washington 25, D. C.

ENCLOSURE "F"

ESTIMATED COSTS OF STRATEGIC OFFENSIVE WEAPON SYSTEMS

WSEG REPORT NO. 50

30 September 1960

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ESTIMATED COSTS OF STRATEGIC OFFENSIVE WEAPON SYSTEMS

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ESTIMATED COSTS OF STRATEGIC OFFENSIVE WEAPON SYSTEMS

PURPOSE

1. To present estimates of the costs of strategic offensive weapon systems during the FY 1961 to 1967 period.

SCOPE

2. This Enclosure contains estimates of the costs of strategic offensive weapon systems in being and scheduled to attain operational status in this period. Costs are given for both delivery systems and nuclear weapons.

3. The reliability of these estimates is discussed and examples are given showing changes in estimates as weapon systems progress from developmental to operational status.

4. Because of the particular importance of the MINUTEMAN and POLARIS weapon systems, their costs are examined in detail and the results of the analysis appear in Appendices "B" and "C" respectively.

SUMMARY

5. In FY 1961 the total costs directly attributable to strategic offensive weapon systems amount to about $10.4 billion or about 25 percent of the total Defense budget. If the force projections in this report are implemented, and if the estimates of costs are correct, the total funds for strategic weapons considered will amount to about $10.7 billion in each of the Fiscal Years 1962, 1963, and 1964, and will fall thereafter to a low of less than $5 billion in FY 1967. However, it can be expected that funds required for strategic systems in the later years of the period 1961 to 1967 will be increased by: (1) more funds for procurement and operation of systems now under development; (2) increases in

estimates of costs, especially for those systems now in the early stages of development; and (3) additional funds for development and procurement of new weapons systems.

6. The costs of strategic surface-to-surface missile systems have now begun to exceed the costs of strategic aircraft and related systems. Present plans indicate that by FY 1967 surface-to-surface missiles will absorb more than twice the funds allocated to aircraft.

7. The unit cost of bombs and warheads, after deducting the salvage value of nuclear materials, is relatively low as compared with the unit cost of the weapon system. In most cases the net cost of the warhead and/or bombs is less than 10 percent of the cost of its carrier.

8. The weapon system costs presented in this Enclosure are of varying reliability.

a. Cost estimates based on production contracts and operational experience are quite accurate.

b. For systems for which overall system designs are not firm, or for systems where estimated costs are contingent on meeting stipulated system reliability, etc., considerable uncertainty exists.[1/]

c. Cost estimates for systems which are in earlier stages of development are subject to even more uncertainty. Based on past experience such estimates are likely to be too low.[2/]

9. The estimates available to WSEG indicate that the POLARIS missile is, for equivalent numbers procured, greater in cost than the MINUTEMAN missile. No reason has been found to fully account for the anomaly.

1/ See paragraph 22 for examples.
2/ Ibid.

DISCUSSION

BACKGROUND OF THE COST AND FORCE LEVEL ESTIMATES

10. The estimates of projected force levels and associated costs employed in this report were obtained from the Services through the mechanism of the Military Systems (MS) Reports. Submitted specifically for this WSEG study were: (a) Air Force MS-3½, "Report on Selected Strategic and Tactical Weapon Systems" (Prepared for the Weapons Systems Evaluation Group, 11 April 1960), and (b) Navy, CNO, MS-3.2, "FBM Weapon System Cost Estimates," 27 April 1960. Data on force schedules in all cases were reported through FY 1967. Funding data were reported through FY 1965 in the Air Force submission and through FY 1967 in the Navy submission. The funding estimates for Air Force systems in FY 1966 and FY 1967 are extrapolations by WSEG of the Air Force data.

11. The MS series in its present form was initiated in WSEG and represents the joint efforts of WSEG, the Joint Staff, OSD Comptroller, and most importantly, the Services themselves. The purpose of the MS series is to secure periodically, on a comparable basis amongst systems and Services, the estimated costs of all weapon and supporting systems for stipulated force schedules over a period of years into the future in the context of total Departmental budgets. The instructions governing the preparation of these reports were prepared by OSD Comptroller with the assistance of WSEG and the Joint Staff.

12. Two main types of cost estimates appear in the MS series. The first of these shows the amounts of funds allocated annually to each weapon system, by OSD appropriation title and by weapon system, over a period of years. The current reports cover the period BY 1958-FY 1965 with force projections running through FY 1967. The OSD appropriation titles are as follows: Research,

Development, Test, and Evaluation; Procurement for Development, Test, and Evaluation; Procurement for Service Use; Industrial Facilities; Military Construction; Operation and Maintenance; and Military Personnel. The sum of the funds for these headings constitutes the total annual program cost of creating and maintaining the force schedules stipulated for the given weapon or support system. The separate headings can be conveniently regrouped and combined into three principal types of cost: Research, Development, Test, and Evaluation; Investment Costs; and Operating Costs.

13. The second main type of cost estimate shows the average investment embodied in an organizational unit (battalion, squadron, etc.) of a weapon or support system, and the average annual operating cost of such a unit. In this Enclosure the organizational unit costs of Air Force systems, reduced to a per aircraft or per missile basis, were derived from the Air Force MS-3½ A forms (see Appendix "A") and are not as reported on the MS-3½B forms. This procedure was followed in order to maintain consistency between organizational unit costs and the program amounts reported in the funding estimates.

NATURE AND RELIABILITY OF THE ESTIMATES

14. Several points need to be made concerning the nature of cost estimates. First, a given set of estimates pertains only to one stipulated force schedule for a weapon system. Any alteration in force projections requires an alteration in program costs and if such alteration be substantial, the costs per organizational unit will also change. Second, changes in system specifications and configuration, operational modes, or rates of activity also necessitate concomitant changes in cost estimates. Third, the estimates represent net costs and do not

include the costs of assets (airbases, facilities, equipment, trained personnel, etc.) inherited from previous systems. Fourth, no weapon system cost estimates are completely accurate or reliable and estimates pertaining to future systems are much less reliable than those on current systems. This last point will be expanded upon in the following paragraphs.

15. It is obvious that in the case of currently operational weapon systems, cost estimates are relatively reliable. Records exist showing the amounts paid out for procurement, construction, and so forth. On the basis of this experience, estimates of current and future costs can be made in which considerable confidence can be placed. Future changes in the weapon system program as to its size, hardware and base configuration, or alert status will still inject uncertainty into estimates of future costs, but the amount of error is relatively small and estimates vary within a narrow range over a period of years. Thus Air Force estimates of B-52 investment costs have been on the order of $13.5 to $14.5 million per aircraft, on a program cost basis (including air bases, trained personnel, etc.) from August 1958 to the present.[1/]

16. Considerable uncertainty, however, attaches to cost estimates for future systems. To a large degree this results from uncertainty or lack of complete information as to the exact characteristics of such weapon systems in their eventual operational form. Costs are sensitive to variations in program size, degree of hardness and dispersal, alert status, training specifications, maintenance

1/ a/ Department of the Air Force, Major Military Systems Cost Data (MS-1), 26 August 1958.
b/ Department of the Air Force, Report on Weapon and Support Systems, 25 June 1959.
c/ U.S. Air Force, Report on Major Military Programs (MS-3), 1 October 1959.
d/ Department of the Air Force, Report on Selected Strategic and Tactical Weapon Systems (MS-3½), 11 April 1960.

policy and equipment failure rates, communications patterns and many other factors. All these elements are for many reasons subject to frequent changes, each of which necessitates a change in cost estimates. Thus, it is incumbent upon the user of such estimates to understand their nature and to employ them with caution.

17. An example of the manner in which cost estimates are influenced by different possibilities in system configuration is provided by the hardened and dispersed mode for MINUTEMAN. As presently planned, the early squadrons will require for communications and control an extensive network of buried cable interconnecting silos and launch control centers. The cost of such a cable network is obviously sensitive to terrain conditions. The Air Force estimates that the cost of the cable network will vary between $6 and $18 million per squadron, and that total communications investment will vary between $9.8 and $21.8 million per squadron. However, an intensive effort is being made to develop very low frequency ground wave propagation which would eliminate the cable network. If this effort should prove successful, communications investment would be reduced to the range of $4 to $6 million per squadron.

18. In addition to uncertainty induced by factors of configuration and technology, considerable possibilities for error in cost estimates arise from the lack of firm information on the costs of industrial production of new hardware. In this connection it should be noted that puzzling anomalies exist in cost data on MINUTEMAN and POLARIS missiles (see Table I). Cumulative average cost per curves per missile are plotted in Figure 1 showing Navy estimates of the cost of POLARIS missiles, and Air Force Ballistic Missile Division and preliminary WSEG estimates of the cost of the MINUTEMAN missile. The MINUTEMAN ICBM has one more

FIGURE 1

CUMULATIVE AVERAGE COST CURVES FOR
POLARIS AND MINUTEMAN MISSILES
(UNIT COSTS, INCLUDING SPARE PARTS)

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CUMULATIVE AVERAGE COST CURVES FOR POLARIS AND MINUTEMAN MISSILES

(UNIT COSTS, INCLUDING SPARE PARTS)

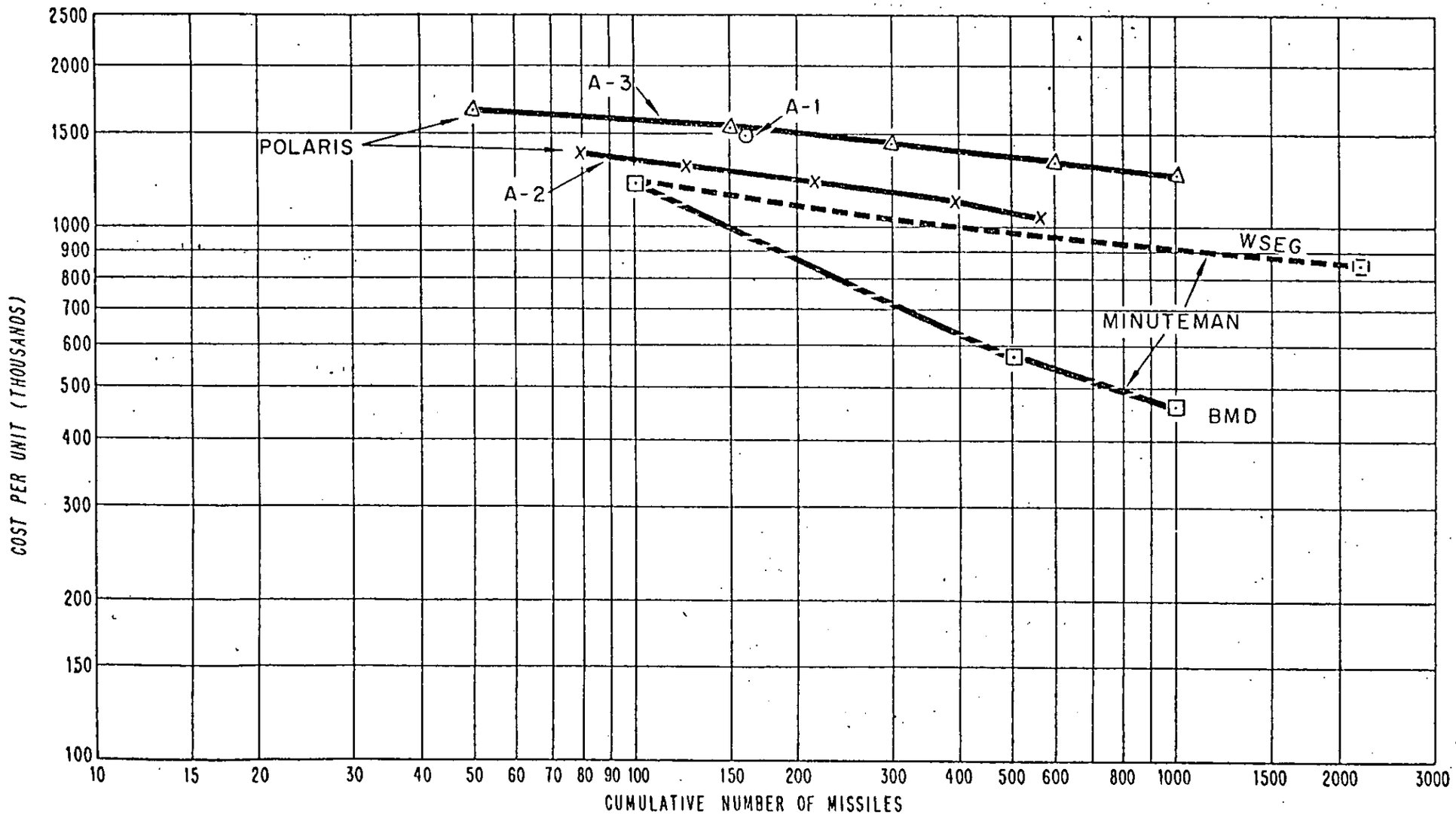

FIGURE 1
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stage and is about 96 percent heavier than the POLARIS A-2 missile, yet the estimated average unit cost for the same quantity, in about the same period of time, is lower for MINUTEMAN. We are forced to the conclusion that either the POLARIS estimate is too high or the preliminary MINUTEMAN estimate is too low.

19. An analysis of component costs for POLARIS and MINUTEMAN missiles is given in Table I. Precise comparisons are not possible owing to differences in definition, but the estimate of MINUTEMAN propulsion on a per pound basis and guidance systems on a per missile basis should be, at least, roughly comparable to similar POLARIS costs.

TABLE I

AVERAGE UNIT COSTS OF MAJOR COMPONENTS OF POLARIS AND MINUTEMAN MISSILES

(Thousands of Dollars)

POLARIS (Navy Estimates)	A-1 (159 Units)	A-2 (570 Units)	A-3 (1005 Units)
Motors (Aerojet)	$ 386	$ 418	$ 595
Airframe	578	418	372
Guidance and Controls	356	210	223
Arming and Fuzing	(Nil)	(Nil)	50
Spare Parts	163	a/	a/
Total	$1,483	$1,046	$1,240

MINUTEMAN (Preliminary WSEG Estimates) b/	Average for 500 Units	Average for 1000 Units
Propulsion (Thiokol and Aerojet)	$ 293	$ 273
Airframe	256	240
Guidance and Controls	309	286
Other (Re-entry body and A.K.)	32	28
Spare Parts	90	83
Total	$ 980	$ 910

a/ Included in preceding items.
b/ See Appendix "B". A detailed explanation of the derivation of these estimates appears in Second Annual Review of WSEG Report No. 23, 14 August 1959.

20. As might be expected, motor costs for POLARIS increase with range, the A-3 motors costing 42 percent more than A-2 (in spite of the saving in A-3 unit cost due to quantity production). The three MINUTEMAN motors are almost double the weight of the two stages in the POLARIS A-2, but WSEG's estimate of motor costs for about the same quantity of MINUTEMAN missiles is 30 percent less. The spare parts allowance is about the same proportion of total missile costs for both missiles--about 11 percent for POLARIS and 9 percent for MINUTEMAN.

21. As shown in Figure 1, the WSEG estimate for MINUTEMAN is almost the same as the BMD estimate at 100 units, but at 1000 units the BMD average is only about 50 percent of the WSEG estimate. WSEG estimates for MINUTEMAN are preliminary and, in view of the wide disparity between costs of MINUTEMAN and POLARIS missiles (taking into account the great difference in size and range), it is necessary to reserve judgment on the validity of estimates for both missiles until better evidence is obtained on actual contract costs. There is no basis for rejecting the latest Navy estimates for POLARIS, and if they prove to be correct it can be expected that the earlier preliminary estimate for MINUTEMAN will be increased.[1/]

22. While early estimates of the investment cost in a new weapon system may err on either the high or the low side, experience shows that they are apt to be lower, by a substantial amount, than

1/ The WSEG curve for MINUTEMAN has a 90 percent slope through unit number 300 and a 93 percent slope thereafter. As reported by the Air Force (Memorandum for Director, WSEG, 1 June 1959), the cost curve for ATLAS has an 89 percent slope through 300 units and a 95 percent slope thereafter; the TITAN cost curve has a 91 percent, and THOR an 85 percent slope. The slope of the BMD cost curve for MINUTEMAN is 72 percent between units 100 and 500, and 82 percent between units 500 and 1000. The slope of cost curves of this type is defined as the percentage which the cost of $2n$ units is of the cost of n units. Thus if a particular type of missile should cost $800,000 for 1000 units and $720,000 for 2000 units, its cost curve is said to have a 90 percent slope.

the actual cost which is finally incurred. Among the reasons for this phenomenon are: (a) the proponents of a system are optimistic about its future, (b) a system invariably becomes more complex as it progresses from conceptual and developmental stages towards operational status, and (c) price inflation during the period from early estimates to eventual payment of the bills increases the gap between them. Thus between 1957 and the present, Air Force estimates of the cost of the soft ATLAS squadron increased by 40 percent, and of a hardened TITAN squadron by 28 to 55 percent depending on configuration.[1/] During the same period, Navy estimates of total investment per POLARIS submarine have risen by 59 percent.[2/] During a three-month period in 1959, Army estimates of the cost of a ZEUS battery increased by 20 percent.[3/]

23. With the foregoing caveats in mind we will now proceed to set forth Service programs for strategic weapon systems and to examine estimates of their costs.

STRATEGIC OFFENSIVE WEAPON SYSTEMS FORCE LEVELS

24. For the purpose of this report, WSEG requested the Services to provide MS-series estimates of force level projections on a reasonable basis, FY 1961-67. These force levels, which appear in Table II below, are the ones with which the cost estimates of this paper are associated. It should be noted that THOR and JUPITER do not appear in the table as no U.S. squadrons of these systems are now planned.

1/ Air Force estimates for 1957 are in Memorandum for Director, WSEG, 9 December 1957. Air Force estimates for this study are in "Report on Selected Strategic and Tactical Weapon Systems," (MS-3½), 11 April 1960.
2/ Navy estimates for 1957 are in CNO, Op 515-B, Serial 00758P51, 18 December 1957. Navy estimates for this study are in CNO, MS-3.2, "FBM Weapon System Cost Estimates," 27 April 1960 (see Appendix "C", p. 9-12).
3/ These estimates, reported from Army sources are in "Estimated Costs of CONUS Air Defense," WSEG, 22 June 1959 and WSEG Report No. 45, 23 September 1959.

TABLE II

STRATEGIC OFFENSIVE WEAPON SYSTEMS FORCE PROJECTIONS, FY 1961-67

(Number of Units at End of Fiscal Year)[a]

Weapon System	No. of A/C or Missiles Per Unit	No. of Organizational Units (Sqdns/SSBN's) 1961	1962	1963	1964	1965	1966	1967
A/C Systems								
B-47	15	84	64	52	36	16	0	0
B-52	15	37	42	45	48	48	47	45
B-58	9	4	9	12	12	12	12	12
GAM-72	28	8	14	14	14	14	12	11
GAM-77	14[b]	16	29	29	29	27	18	8
GAM-87	30[b]	0	0	0	5	15	25	29
RB-47	15	6	3	3	3	3	2	0
KC-97	20	30	24	14	9	4	0	0
KC-135	10	40	46	53	62	70	70	68
C-124	16	2	1	1	1	1	1	1
B-70	n.a.	0	0	0	0	0	0	1[c]
Missile Systems								
ATLAS: 3x3 Soft	10	4	4	4	4	4	3	2
1x9 Hard	10	1	3	3	3	3	3	3
1x12 Hard	13	0	2	6	6	6	6	6
TITAN: 3x3 Hard	10	0	5	6	6	6	6	6
1x9 Hard	10	0	0	3	8	12	12	12
1x18 Hard	20	0	0	0	0	0	2	4
POLARIS/SSBN:	16	5	7	10	14	26	38	45
MINUTEMAN: Fixed	50	0	0	2.4	13	24.5	40	40
Mobile	30	0	0	1	5	10	10	10
SNARK:	30	1	1	1	0	0	0	0

a/ Figures on the number of organizational units at the end of each fiscal year shown in this table for the Air Force do not agree with those shown in Enclosure "D", Table I. The data above are taken from Department of the Air Force, Report on Selected Strategic and Tactical Weapon Systems (MS-3½), 11 April 1960. The data for Enclosure "D", Table I, were taken from the Air Force Program Guidance Document, P-62-1 and P-62-2. For further explanation see Enclosure "D", page 4, footnote 1.

b/ Interim planning figures for augmentation of B-52's on ground alert. Other numbers being considered are as follows: GAM-77, 18 for ground alert and 23 for airborne alert; GAM-87, 46 for both ground and air alert.

c/ The Air Force program for 12 development aircraft calls for recycling Nos. 2 through 12 to tactical status in the fall of 1966 (FY 1967).

25. While these force projections have as their foundation the FY 1961 President's Budget, it must be realized that many program changes will occur. Some of these changes will emanate from within the Services, while others will emanate from actions by the Executive Branch and the Congress.

STRATEGIC OFFENSIVE WEAPON SYSTEM COSTS, INCLUDING NUCLEAR WEAPONS

26. In this section are presented estimates of the average incremental investment and average annual operating costs per unit for complete weapon systems, with separate estimates of unit costs for the delivery systems and associated nuclear weapons. Estimates of unit costs for the delivery systems are based on funding data furnished by the Military Services, 1/ and nuclear weapon costs are derived from data supplied by the Defense Atomic Support Agency and the Atomic Energy Commission.

27. Table III summarizes these costs for four different surface-to-surface missile systems. Table IV presents estimates of additional investment and annual operating costs for four strategic aircraft, with estimates of similar costs for tanker support. Table V provides estimates of the investment and annual operating costs of nuclear bombs and air-to-surface missiles with nuclear warheads delivered by strategic aircraft.

28. The unit costs for various combinations of bombs and GAM's, given in Table V, can be combined with unit costs of the manned aircraft, given in Table IV, to obtain composite costs of strategic bombers with nuclear weapons.

29. The investment cost for each delivery system in Table III and Table IV, and for the two air-launched missiles in Table V, includes those initial costs which must be incurred to obtain

1/ With the exception of MINUTEMAN.

one additional delivery vehicle with all essential supporting equipment and facilities. Development costs and investment in industrial facilities are excluded here since such costs generally do not vary with the size of the force.[1]

30. It is important to note that investment costs for bombs and warheads, given in Tables III and V, are net after deducting the salvage value of oralloy, plutonium, and tritium. To account for the costs of these nuclear materials (since they can be recovered at virtually full value at the end of the useful life of the nuclear weapons), we have included, together with other operating costs, an annual "rental" charge, which, for lack of a better measure, is assumed to amount to [redacted] of the initial cost of the salvaged materials. Other annual costs attributable to bombs and warheads are as follows: (1) the average annual cost of tritium replacement averaging [redacted] of the initial value of tritium, and (2) the annual cost of maintenance, repair, and replacement, assumed to average about [redacted] of the non-nuclear cost of the bombs and warheads.

31. Unit investment costs given for delivery vehicles in Tables III and IV, multiplied by the maximum force levels, equal the total investment funds programmed for the specified systems.[2] Similarly, the annual operating costs per unit for the same weapons, times the cumulative total number of aircraft- or missile-years, equal the total amount of funds programmed for "Maintenance and Operations and "Military Personnel" in the same period.[3]

1/ Additional funds may be required for industrial facilities if there is a significant increase in the rate of production; but the actual force level may be increased substantially without altering the rate of production simply by extending the period of procurement.

2/ Investment costs for POLARIS in both the SSBN and Cruiser Systems include only one set of missiles, i.e., shipfill, shakedown, and support. See footnote b/; Table III.

3/ See Table II above for force levels, and Table III, Appendix "A". Note that no funds have been approved for POLARIS installations on cruisers, or for operational B-70 aircraft. Also, note that in a few cases the maximum force level was achieved before 1961.

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TABLE III

SUMMARY OF INVESTMENT AND OPERATING COSTS FOR STRATEGIC SURFACE-TO-SURFACE MISSILE SYSTEMS; AVERAGE COST PER MISSILE FOR DELIVERY SYSTEM AND NUCLEAR WEAPONS

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TABLE IV

ESTIMATED INVESTMENT AND ANNUAL OPERATING COST OF STRATEGIC BOMBERS WITH TANKER SUPPORT AND QUAIL DECOYS[a]

System	Average Cost per Bomber (Millions of Dollars)	
	Additional Investment	Annual Operating
B-52 - Ground Alert		
B-52 System	13.51	1.11
KC-135 Tanker Support[b]	3.11	0.24
Four GAM-72 QUAIL	2.55	0.07
Total B-52	19.17	1.42
B-52 - One-Fourth Air Alert		
B-52 System and Tanker Support	17.61	2.55
Four GAM-72 QUAIL	2.55	0.07
Total B-52	20.16	2.62
B-47		
B-47 System	3.99	0.59
KC-97 Tanker Support[b]	0.99	0.18
Total B-47	4.98	0.77
B-58		
B-58 System	33.21	0.85
KC-135 Tanker Support[b]	4.67	0.36
Total B-58	37.88	1.21
B-70		
B-70 System[c]	64.00	3.50
KC-135 Tanker Support[b]	4.67	0.36
Total B-70	68.67	3.86

a/ Summarized from Table I, Appendix "A". Note that QUAIL Decoys are used only with B-52's.

c/ Preliminary estimate prepared by WSEG; see paragraph 3, Appendix "A".

TABLE V

ESTIMATED INVESTMENT AND ANNUAL OPERATING COSTS PER UNIT FOR NUCLEAR BOMBS AND AIR-TO-SURFACE MISSILES WITH NUCLEAR WARHEADS a/

(Thousands of Dollars)

ITEM	Incremental Investment Per Unit	Annual Operating Cost Per Unit
A. Nuclear Bombs		
1. Mk 15, Mod 0		
2. Mk 28, Mod 0, Y1		
a. Internal		
b. External		
3. Mk 36, Mod 2, Y1		
4. Mk 39, Mod 1, Y1		
5. TX 41, Y1		
6. TX 43, Y1		
7. TX 53, Configuration 1		
B. Air-to-Surface Missiles With Warheads		
1. GAM-77, HOUNDDOG With Mk 28, Mod 0, Y1 Warhead		
2. GAM-87, SKYBOLT		
a. With Mk 49, Mod 1, Y2 Warhead b/		
b. With XW-56 Warhead b/		

a/ Summarized from Tables I, II, and III of Appendix "A". See paragraph 30 for basis of unit costs for nuclear bombs and GAM warheads.

b/ Warheads for the two GAM-87 configurations have not yet been selected. The Mark 49, Mod 1, Y2 weighing , and the XW-56 weighing about come nearest to meeting the specified weights and yields.

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Unit costs given here may, therefore, be used to derive rough estimates of fiscal requirements for alternative force levels of the specified systems for any given period of years.

32. The derived estimates of changes in funds associated with assumed increases or decreases in force levels will only be approximately accurate, since a major change in procurement will probably have a significant effect on the unit cost of the weapon and associated supporting equipment. If, for example, the number of operational POLARIS missiles and submarines were to be doubled we would expect: (1) a slight decrease in the unit cost of the missiles; (2) very little change in the unit cost of submarines; (3) more investment in overhaul facilities for both submarines and missiles; and (4) an expansion in the capacity of facilities for missile and submarine production.

33. Figure 2, based on Tables III and IV, shows the cumulative cost of one additional unit of six different systems over a ten-year period. Note that these costs exclude bombs and warheads. The cost at year "0" is the initial investment required for one specified unit, to which is added, each year, the annual operating cost per unit.

TOTAL ANNUAL PROGRAM COSTS

34. In this section are presented the total annual costs of achieving and maintaining the proposed forces of strategic offensive weapons. The cost estimates to be employed are in terms of program obligations. In the case of the Navy, program obligations represent the total amounts which the Department plans to place under contract each year for a given program, regardless of the year in which obligating authority was obtained. For the Air Force, the figures represent the total amounts required to fund the program increment authorized in a given year regardless of

FIGURE 2

AVERAGE INVESTMENT AND OPERATING COSTS FOR ONE ADDITIONAL AIRCRAFT OR MISSILE OVER A TEN-YEAR PERIOD FOR SELECTED STRATEGIC SYSTEMS

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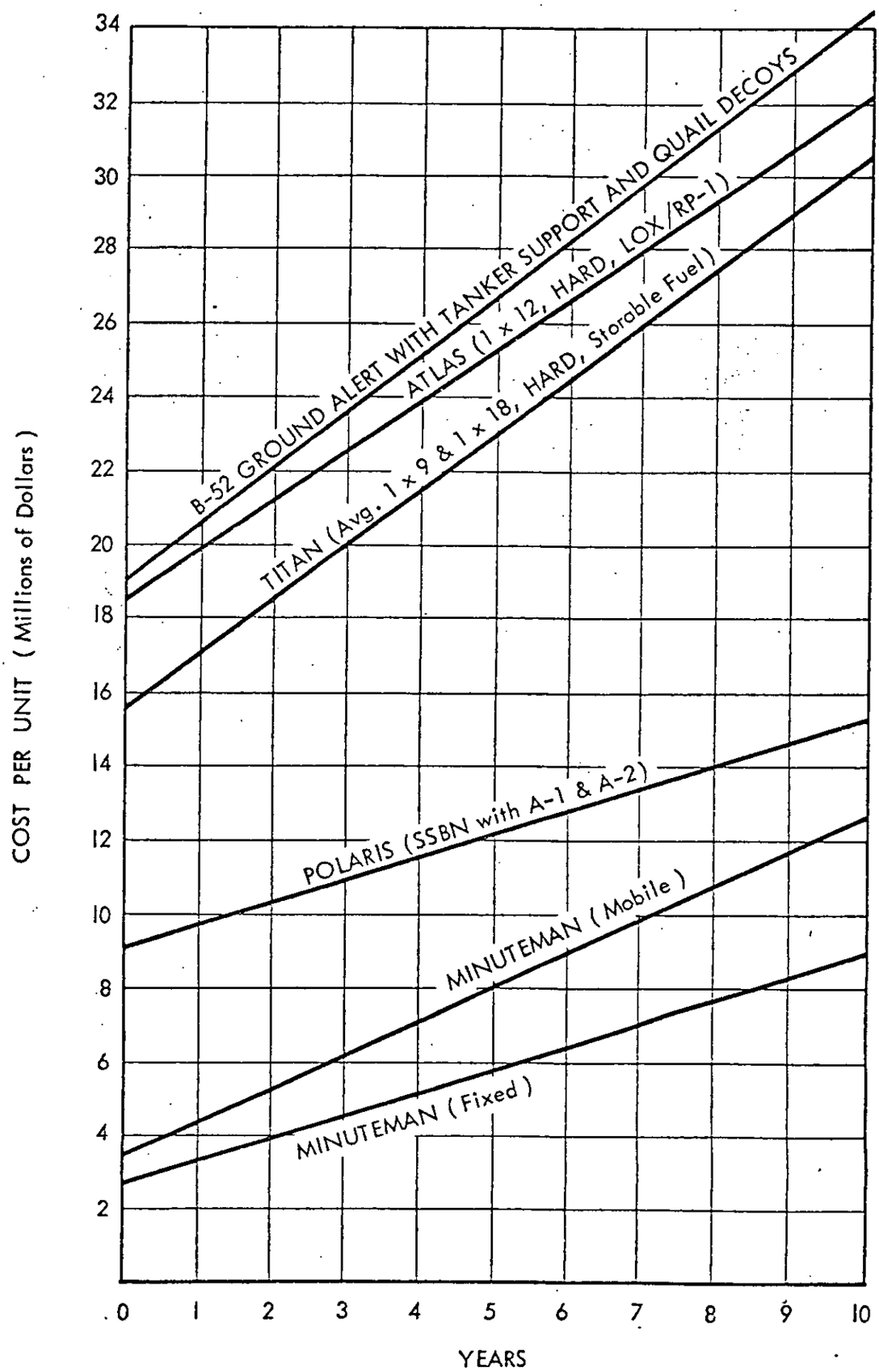
AVERAGE INVESTMENT AND OPERATING COSTS FOR ONE ADDITIONAL AIRCRAFT OR MISSILE OVER A TEN -YEAR PERIOD FOR SELECTED STRATEGIC SYSTEMS *



* Costs include all supporting facilities and associated equipment except bombs, GAM-77 or GAM-87, and warheads.

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FIGURE 2
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TABLE VI

KNOWN STRATEGIC OFFENSIVE WEAPON SYSTEMS - SUMMARY OF ESTIMATED PROGRAM COSTS, FY 1961-67

(Millions of Dollars)

ITEM	1960 and Prior Years	1961	1962	1963	1964	1965	1966	1967	Total 1961-67
A/C Systems[a] Including GAM's	28,215	3,931	3,894	2,742	2,520	1,943	1,272	1,174	17,476
RDT&E	1,591	474	624	674	400	234	69	14	2,489
Investment	21,776	1,730	1,597	471	597	282	-	-	4,677
Operating	4,848	1,727	1,673	1,597	1,523	1,427	1,203	1,160	10,310
Surface-to-Surface Missile Systems	10,952	4,137	4,422	5,568	5,773	4,203	2,859	2,604	29,566
RDT&E	5,853	1,467	1,211	936	521	248	75	57	4,515
Investment	4,899	2,471	2,933	4,224	4,461	2,584	666	77	17,416
Operating	200	199	278	408	791	1,371	2,118	2,470	7,635
Support Functions	n.a	2,331	2,414	2,413	2,408	1,785	1,199	1,097	13,647
Total	-	10,399	10,730	10,723	10,701	7,931	5,330	4,875	60,689

a/ Aircraft system funds would increase considerably, especially during the latter part of this period, if proposals for B-52 airborne alert were approved, and if procurement of operational ANP and B-70 were to begin.

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the year in which the obligations are to be authorized or incurred. This difference in concept does not affect cost comparisons among weapon systems, although the time distribution of total obligations is affected to a minor degree. Overall summary data appear in Table VI above. Included with aircraft systems are the costs of GAM's and support aircraft (tankers, etc.).

35. In FY 1961 strategic offensive weapon systems costs amount to $10.4 billion. Presently foreseeable annual funding requirements for these systems reach a peak of $10.7 billion in FY 1962-1964.

36. The $10.4 billion for strategic offensive weapon systems in FY 1961 represents about 25 percent of the Defense budget. For comparative purposes it may be noted that the other military mission areas and their approximate portions of the FY 1961 budget are as follows: air defense, 18 percent; tactical air forces (Air Force and Navy), 18 percent; land and sea tactical forces, 33 percent. The remaining 6 percent is for overall departmental outlay, such as retirement pay, which cannot be attributed to any mission area.[1/]

37. Although the foreseeable funds requirements for the strategic offensive weapon systems considered here fall to a level of about $5 billion in FY 1967, it does not follow that this figure represents the amount that will actually be required for the strategic mission in that year. This is true because (a) the costs actually experienced in future years will probably be greater than

1/ The classification of mission areas is taken from the Mahon Reports, as follows: strategic includes Air Force strategic deterrent plus Navy strategic deterrent (POLARIS); air defense includes continental air defense for all three Services; tactical air forces include the attack carrier forces of Naval general purpose forces plus Air Force general purpose forces; land and sea tactical forces include all Army forces except continental air defense, and Naval general purpose forces except attack carrier forces. For document references of the Mahon Reports see footnote, paragraph 41.

estimated due to inflation and other factors, (b) weapon systems now under development will require procurement funding as they approach operational status, and (c) entirely new weapon systems will arise for which research and development funds will be needed. To greater or lesser degree the same factors affect the validity of the estimates for fiscal years 1962-66.

38. About $28 billion has been devoted to current strategic aircraft weapon systems up to the present time. Most of these funds (77 percent) were allocated to investment. Of the $17.5 billion scheduled for these systems in the next seven years, however, only slightly more than one-quarter is for investment, while nearly 60 percent is for the operation of these systems. Investment in currently operational aircraft systems is scheduled to end in FY 1965. RDT&E, mainly for the B-70 and ANP, represents a significant portion of total funds, especially in the earlier part of the FY 1961-1967 period. Procurement of operational B-70's and ANP aircraft, if approved, would require substantial amounts of additional investment funds during the latter part of this period.

39. Nearly $11 billion has been obligated for strategic surface-to-surface missile systems during the years prior to FY 1961. Over one-half of this amount has been for RDT&E, somewhat less than half for investment in operational units, and a small amount for annual operating expenses of these units. While investment will represent nearly 60 percent of total missile funds of $30 billion for the FY 1961-1967 period as a whole, it will have been largely completed by the end of FY 1965. RDT&E funds, for these systems are scheduled to decline to small amounts. As more units are activated, funds for the annual expenses of operational units will rise steadily throughout the period.

40. Strategic aircraft and related systems are now absorbing fewer funds than strategic surface-to-surface missile systems, which is a reversal of the situation at the beginning of FY 1960. By FY 1967 missile systems will be receiving more than twice the funds allocated to aircraft systems.

41. Funds for support functions represent outlays on training, logistics, communications, research and development and intelligence and other activities not allocable by weapon system. Estimates for these functions are very approximate and are largely based on the so-called Mahon Reports[1/] prepared by the Services in the autumn of 1959.

42. The program costs shown in Table VI exclude for the B-52 the costs of continuous airborne alert. Air Force estimates of the additional costs (over and above Table VI), including KC-135 tanker support, which would be incurred to achieve and to fly a one-eighth and a one-quarter continuous airborne alert are, in millions of dollars.

	FISCAL YEARS						
Mode	1961	1962	1963	1964	1965	1966	1967
One-eighth	64	272	289	357	383	374	357
One-quarter	504	639	943	1,065	1,068	1,044	997

1/ Army: Department of the Army, Functional Category Presentation, FY 1960-1961 Budget Estimates, 12 October 1959, SECRET.
Navy: Department of the Navy, Memorandum from Secretary of the Navy to Secretary of Defense, 27 October 1959, Subject: Functional Costing, SECRET.
Air Force: Department of the Air Force Functional Category Presentation of FY 1961 Budget Estimates to Office, Secretary of Defense, 15 October 1959, SECRET.

43. One-eighth air alert means that an average of 6 combat-ready B-52's in each wing are airborne; similarly, on one-fourth air alert an average of 11.2 combat-ready B-52's in each wing are airborne. The schedule for airborne alert, as reported by the Air Force, is as follows:

FY Qtr.	A/A Sortie Rate Per Wing	No. of Sqdns C.R.B-52	No. of Aircraft Flying Alert
1/62	6	30	60
2/62	9	30	90
3/62	11.2	32	116
4/62	11.2	33	120

(Units phased into flying alert at the 6 rate for one quarter, the 9 rate for the second quarter, going to the 11.2 rate at beginning of 3rd quarter.)

44. Figures on total funding for each weapon system are shown in Table VII, and in Figure 3. Detailed estimates of RDT&E, investment, and operating funds by weapon system appear in Appendix "A", Table V.

TABLE VII

STRATEGIC OFFENSIVE WEAPON SYSTEMS ESTIMATED PROGRAM COSTS FY 1961-67

(Millions of Dollars)

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TABLE VII

STRATEGIC OFFENSIVE WEAPON SYSTEMS ESTIMATED PROGRAM COSTS FY 1961-67[a]

(Prior years funding excluded)

(Millions of Dollars)

SYSTEMS	1961	1962	1963	1964	1965	1966	1967	TOTAL FY 1961-67
Aircraft and Related Systems	3,931	3,894	2,742	2,520	1,943	1,272	1,174	17,476
Bomber Aircraft	2,548	2,360	1,263	1,209	1,103	880	855	10,218
B-47	635	508	402	305	180	0	0	2,030
B-52[b]	1,391	1,358	784	821	840	789	764	6,747
B-58	522	494	77	83	83	91	91	1,441
GAM's	290	203	318	312	276	51	54	1,504
GAM-72	63	5	6	6	6	6	5	97
GAM-77	167	41	18	18	17	15	8	284
GAM-87	60	157	294	288	253	30	41	1,123
Support Aircraft	691	766	546	599	330	272	251	3,455
KC-97	247	216	154	93	53	0	0	763
KC-135	372	498	356	470	241	241	240	2,418
C-124	24	16	11	11	11	11	11	95
RB-47	48	36	25	25	25	20	0	179
R&D Aircraft Projects	402	565	615	400	234	69	14	2,299
ANP	72	75	92	106	93	40	10	488
B-70	330	490	523	294	141	29	4	1,811
Surface-To-Surface Missile Systems	4,137	4,422	5,568	5,773	4,203	2,859	2,604	29,566
ATLAS	1,278	354	316	139	139	174	162	2,562
TITAN	1,039	945	954	1,084	888	278	331	5,519
MINUTEMAN	522	1,223	1,991	2,472	2,095	1,526	1,569	11,398
POLARIS	1,256	1,857	2,264	2,044	1,050	850	542	9,863
Other [c]	42	43	43	34	31	31	0	224
Support Functions	2,331	2,414	2,413	2,408	1,785	1,199	1,097	13,647
TOTAL Strategic Systems	10,399	10,730	10,723	10,701	7,931	5,330	4,875	60,689

[a] Data do not reflect actions taken since April 1960 with respect to the FY 1961 budget.

[b] Excludes costs of continuous airborne alert, as follows:

One-eighth of combat force airborne	64	272	289	357	383	374	357	2,096
One-quarter of combat force airborne	504	639	943	1,065	1,068	1,044	997	6,260

To date $185 million in new funds (FY 1960 and 1961) have been approved for an "on-shelf" airborne alert capability program.

[c] SNARK, THOR, JUPITER.

ENCLOSURE "F"
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FIGURE 3

TOTAL ANNUAL PROGRAM COSTS OF STRATEGIC OFFENSIVE WEAPONS SYSTEMS, FY 1961-1967

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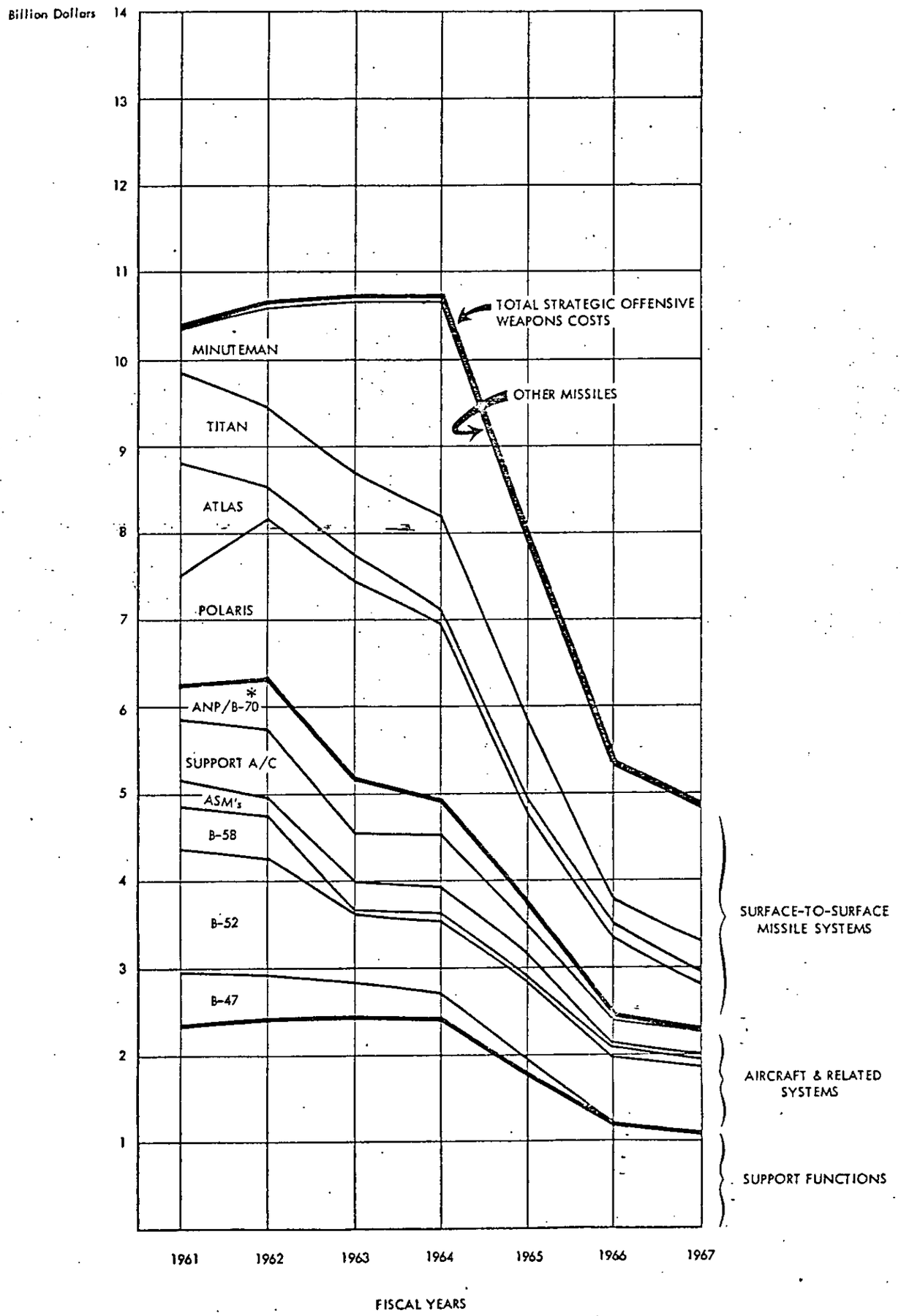
TOTAL ESTIMATED ANNUAL PROGRAM COSTS OF PRESENTLY PLANNED STRATEGIC OFFENSIVE WEAPONS SYSTEMS FY 1961-6



*Research and Development only.

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FIGURE 3
ENCLOSURE "F"
WSEG REPORT NO. 50

APPENDIX "A" TO ENCLOSURE "F"

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

AS DEFINED BY ATOMIC ENERGY ACT OF 1954

APPENDIX "A" TO ENCLOSURE "F"

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

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