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Soviet Forces for Intercontinental Attack

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NOTE

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The Central Intelligence Agency and the intelligence organizations of the Departments of State and Defense, the AEC, and the NSA.

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The Director of Intelligence and Research, Department of State

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The Director, National Security Agency

The Assistant General Manager, Atomic Energy Commission

Abstaining:

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SOVIET FORCES FOR INTERCONTINENTAL ATTACK

THE PROBLEM

To assess the strength and capabilities of Soviet forces for intercontinental attack, to estimate their size and composition through mid-1975, and to forecast general trends thereafter.

SUMMARY CONCLUSIONS

I. PRESENT STATUS OF SOVIET INTERCONTINENTAL ATTACK FORCES

General

A. The intercontinental attack forces considered in this paper include intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and heavy bombers. In the course of the past 10 years the Soviets have engaged in a vigorous and costly buildup of these elements of their military establishment. While all defense spending increased during the period, the estimated share allocated to these forces doubled, going from about 5 percent in 1960 to more than 10 percent in the later years of the decade. The 1969 level—an estimated 2.3 billion rubles (the equivalent of $5.6 billion)[1]—was more than three times as high as the 1960 level. For the decade as a whole, spending on intercontinental attack forces accumulated to about 16

[1] The dollar figures (appearing in parenthesis after the rubles) are approximations of what it would cost to purchase and operate the estimated Soviet programs in the US.

billion rubles (about $36 billion) with ICBMs accounting for about 80 percent of this amount. These figures do not include the cost of research and development (R&D), which rose faster during the 1960s than any other component of Soviet defense spending, and which we estimate has now surpassed that of the US.

B. As a result of this effort, the Soviets had on 1 October 1970 an estimated 1,291 operational ICBM launchers at operational ICBM complexes, and they will have an estimated 1,445 launchers operational by mid-1972. To this number may be added: (1) an estimated 80 SS-11 launchers (120 by mid-1972) believed to be deployed at intermediate-range ballistic missile (IRBM) and medium-range ballistic missile (MRBM) complexes and possibly intended for use against Eurasian targets, which are nevertheless capable of reaching the US, and (2) some 90 launchers which we believe are located at test or training sites. Of the 1,445 ICBMs estimated to be at operational complexes by mid-1972, 306 probably will be of the large SS-9 type and 850 the smaller SS-11. The remainder will consist of older SS-7 and SS-8 missiles, plus an estimated 80 of the small, solid-propellant SS-13s.

C. While these ICBM programs were under way, the Soviets were also energetically developing nuclear-powered, ballistic-missile-firing submarines. Of these the most notable is the Y-class, which, like the US Polaris, has 16 tubes for launching missiles. The missile presently carried by this class has an estimated range of about 1,300 n.m., a yield of [ ] and a system Circular Error Probable (CEP) of [ ] Y-class submarines are now being produced at the estimated rate of 7-8 a year; we believe that 14 are now operational and that some 5 others are in various stages of fitting out and sea trials. Another 12 or 13 are believed to be in various stages of assembly. Besides the Y-class there are submarines of earlier design which could contribute to the intercontinental attack mission.

D. The USSR has not, in recent years, shown equal interest in manned bombers of intercontinental capability. At present there are 195 heavy bombers and tankers operational, all of them of the Bison and Bear types, whose designs date from the 1950s. We believe that a prototype now exists of a new aircraft, [ ] It might be used in an intercontinental role, and the force may be built up beginning about 1974 or 1975.

The Principal Types of ICBMs

E. The SS-11, by far the most numerous of Soviet ICBMs, is estimated to have a CEP of[ ]and a yield[ ]It is thus a weapon best suited for use against soft targets—cities, industrial installations, and some military targets. It can reach all parts of the US, but has also been tested to ranges as short as 500-600 n.m., indicating much flexibility in its possible uses. In 1969 testing began of a modified version. Analysis of these tests has not yet produced a full understanding of their implications; we remain confident nevertheless that the modified SS-11 will still be a soft-target weapon, designed to improve the ability to penetrate antiballistic missile defenses. Deployment of the SS-11 may have ceased at ICBM complexes, and appears to be tapering off at IRBM and MRBM complexes.

F. The SS-9 now exists in four variants: Mod 1, which carries a reentry vehicle (RV) weighing about 9,500 pounds; Mod 2, whose RV weighs about 13,000 pounds; Mod 3, which has been tested both as a depressed trajectory ICBM (DICBM) and as a fractional orbit bombardment system (FOBS); and Mod 4, which carries three RVs. Leaving Mod 3 aside for the time being, our analysis of evidence on the capabilities of Mods 1, 2, and 4 turns up some perplexing problems.

G. There is general agreement that the SS-9 was developed, early in the 1960s, to provide better accuracy and a larger payload than the SS-7, presumably for use against hard targets—i.e., the US Minuteman system. The Mod 1 appears reasonably well adapted for this purpose. In 1965, however, the Soviets began to test the Mod 2, which with its heavier payload was estimated to have a yield of[ ]These tests were pursued with great vigor, and the Mod 2 was actually deployed before the Mod 1.[ ]But the Mod 2 has never in its numerous flight tests actually demonstrated enough range to reach any Minuteman complexes. We believe that its demonstrated range could be increased sufficiently to cover most or all of them (there are differences on this point) by using up more of the available propellant, removing telemetry packages, etc. Yet it remains curious that

the Mod 2, alone among ICBMs except the SS-13, has never been tested to what we would presume to be its intended operational range.

H. The kill probability of a missile against hard targets is more sensitive to accuracy than to yield. The accuracy of the SS-9 cannot be ascertained from observations. It must be deduced [

] In the Intelligence Community, opinions as to the CEP of the SS-9 range from a low of 0.4 n.m. to a high of 0.7, with the most probable figures being either 0.5 or 0.6. Small as they may appear, the significance of these differences is considerable.[1] It is generally agreed that in actual operational employment, accuracies in the force as a whole would be somewhat poorer.

I. In sum, with respect to the capability of the Mod 2 against Minuteman, we have estimated that it can have sufficient range to reach most or all targets even though such range has not been demonstrated in tests. We see no reason to doubt that in the event of general war the Soviets would use it for whatever it could accomplish against the Minuteman system. But, the Soviets would have to deploy several times the present number of SS-9 Mod 1 and Mod 2, with their present capabilities, before achieving a force which would pose a serious threat to the Minuteman force as a whole. This brings us to a consideration of the Mod 4.

J. In August 1968, the Soviets began testing the SS-9 Mod 4, carrying three RVs. By April 1970, they had carried out 17 tests, about the usual number for a missile before it goes into operational deployment. In these tests, the three RVs [

] were not independently targetable, and the weapon as tested was not a multiple independently targetable re-entry vehicle (MIRV). [ ] we presume that the Mod 4 has not been operationally deployed, though it could be at any time.

[1] See paragraphs 52-54 for a discussion of the effect of differences in accuracy and yield.

K. In October 1970, tests resumed, and by 5 November there had been four more. One of these was like the earlier tests; one was a failure. The two others exhibited [ ] one practicable method of developing a MIRV, though it is a different method from that used by the US. Data are still scanty, and analysis far from complete. Should the Soviets decide to deploy a MIRV system based on these tests they could probably begin to do so in late 1971, using the present SS-9 guidance system. This guidance system would give each RV a CEP no better than that of the SS-9 with a single RV. The yield of each of the three RVs is estimated to be [ ] The Mod 4 has sufficient range to reach Minuteman silos.

L. Returning now to the SS-9 Mod 3, as observed above it has been tested both as a DICBM and as a FOBS. In neither form does it have sufficient accuracy to attack hard targets effectively; its apparent function would be to attack soft strategic targets, avoiding early detection by the US Ballistic Missile Early Warning System. (New US warning systems give promise of reducing or eliminating this advantage.) There is some difference of opinion as to the capability of this vehicle operating as a FOBS. It is agreed, however, that the Mod 3 has been deployed only to a very limited extent, and that its future deployment will also be limited.

II. SOVIET POLICY AND FUTURE PROGRAMS

M. The broader reasons for the USSR's energetic buildup of intercontinental attack forces are neither complex nor obscure. In the early 1960s the Soviet leaders, politically and ideologically hostile to the US, and thinking and behaving as rulers of a great power, perceived that in this particular respect their military forces were conspicuously inferior to those of their most dangerous rival, the US. Consequently, they set themselves to rectify the imbalance—to achieve at a minimum a relation of rough parity. Parity in this sense cannot be objectively measured; it is essentially a state of mind. Such evidence as we have, much of it from the strategic arms limitation talks, indicates

that the Soviet leaders think that they have now achieved this position, or are about to achieve it, at least in respect to weapons of intercontinental range.

N. Many aspects of the present force structure are also susceptible to simple and probably correct explanation. The Soviets built a large number of ICBMs in order to match—and now to surpass—the number of US ICBMs, and also to increase the probability that many would survive an initial US attack. They built missile-launching-submarines which are virtually invulnerable to attack when deployed, and they retained a manned bomber force as yet another option.[8] The intercontinental attack force is obviously capable of being used in war, but there is no reason to believe that the Soviet leaders intend deliberately to make nuclear war. The force is an attribute of power, an instrument to support policy, a deterrent to the US.

O. Looking to the future, it seems clear that the Soviet leaders intend to maintain at a minimum such forces as will continue to give them—in their own phrase—a sense of "equal security" with the US. One method of doing so might be through an arms limitation agreement; they appear seriously interested in this possibility. We do not know whether an agreement will be reached, or on what terms. If it were indeed concluded, the development of Soviet intercontinental attack forces would be subject to its terms, but in this Estimate we confine ourselves mainly to a consideration of the situation in the absence of agreement.

P. With the general attitudes and policies of the USSR being what they are, it might seem obvious to infer that the Soviet leaders will strive to achieve marked superiority over the US in strategic weaponry. We do not doubt that they would like to attain such a position. The question is whether they consider it a feasible objective—whether they believe the chances of success good enough to justify allocation of the necessary resources, adjustment to the political implication of an all-out arms race, and acceptance of the risk that instead of sur-

[8] Maj. Gen. Rockly Triantafellu, the Assistant Chief of Staff, Intelligence, USAF, does not believe Soviet missile-launching submarines are virtually invulnerable to attack. Based on the discussion of Soviet submarine patrol activity (paragraphs 127-132), only a few appear to be deployed at any one time; the remainder become vulnerable soft-targets in port. In view of extensive US efforts in ASW operations he further believes that some portion of the deployed subs would also be vulnerable and that vulnerability will increase as ASW technology improves.

passing the US they might fall behind, especially in the technological competition. They might, in any case, think it feasible to seek a strategic posture that, while falling short of marked superiority, makes clear that the Soviets have advantages over the US in certain specific areas. For example, they can now claim an advantage in numbers of ICBM launchers. While this might not be significant militarily, it would help to dramatize the strategic power of the Soviet Union.

Q. But even if Soviet intentions go no further than maintenance of "equal security," their arms programs are bound to be vigorous and demanding. This is in part because Soviet leaders must have an eye not to what forces the US has at present, but to what it can have, or may have, in future years. In this respect they are likely to be cautious—to overestimate rather than underestimate the US threat. Moreover, the weapons competition nowadays is largely a technological race; each side is impelled to press forward its R&D lest it be left behind. Weapons programs also tend to attain a momentum of their own; the immense apparatus of organizations, installations, personnel, vested interests, and so on, tends to proceed in its endeavors unless checked by some decisive political authority.

R. On the other hand, there are constraints upon Soviet arms programs. The most obvious is economic; resources are not unbounded; the civilian economy demands its share; one weapon system competes with another for allocations; and intercontinental attack forces compete with strategic defense and general purpose forces. The various bureaucracies with interests in one or another area compete partly with rational argument and partly in sheer political infighting. Soviet leaders must also consider how far they may wish to press their own programs lest they provoke countervailing programs in the US. And they must assess not only the present and future US threat, but also that from China, and elsewhere.

S. While the foregoing considerations probably govern the nature of Soviet decisions as to future weapons programs, they provide us with little or no basis on which to estimate in detail what these programs will be. We have never had solid evidence on the problem, and there is no reason to expect that we shall have such evidence in the future. Moreover, in the present era the rapidity of technological advance tends to produce especially vigorous action and reaction be-

tween military programs of the USSR and the US, and it has made the strategic relationship more susceptible to change than ever before.

T. Yet the possibilities are not unlimited, certainly in the next five years or so. For one thing, intercontinental weapons systems are of such complexity that their development, testing, and deployment take a long time. We can observe the testing phase, and thus project potential deployments. It usually takes about two years from the time we observe the first flight test of a new ICBM until that system becomes operational in the field. The interval for SLBMs is about the same or longer, and for bombers it is much longer. We can therefore estimate with much confidence that the *kinds* of weapons systems deployed by the Soviets during the next two years or so will be those already in operation or in the late stages of development. Even in the period from two to five years from now the force will be composed largely of existing kinds of delivery vehicles, though towards the end of the period some new ones may come into operational status, and some older ones be retired.

U. Because of the lead times involved in construction and deployment, we can also be highly confident of the *number* of launchers of intercontinental weapons which will be operational up to about two years from now. Beyond two years uncertainty increases as the time period of projection increases. Some reasonable limits to this uncertainty can nevertheless be derived from our knowledge of past deployment rates, especially those obtaining at a time when the Soviets appeared to be making a particularly vigorous effort.

V. But it is not in new types of weapon systems or in gross numbers of launchers that the most significant developments in Soviet forces for intercontinental attack will probably lie during the next several years. Rather it is in *qualitative improvements* to present systems, and of these the most important are in accuracy of missiles and multiple re-entry vehicles for them.

1. *Accuracy.* On technical grounds, we believe that the Soviets, without going to new guidance concepts but mainly by improving the components of the present guidance systems and changing the configuration of their RVs, could in two years achieve CEPs of about 0.25 n.m. for their ICBMs, and begin to introduce these improvements into the force. Hitherto, the Soviets have dem-

onstrated no urgent disposition to achieve high accuracies. But they are likely to do so—at least for the SS-9—in the next few years, primarily because of the great increase in capability against hard targets which this development would afford them, and because, if for no other reason, the necessary technical developments are sure to occur in the normal course of product improvements.

2. *Multiple Independently Targetable Re-entry Vehicles.* We continue to expect the Soviets to develop MIRVs capable of attacking hard targets such as Minuteman. These could proceed from the current SS-9 Mod 4 program, or from a different concept such as that represented by the "bus" system used by the US. With the high order of accuracy desired in a hard target MIRV, we think that neither could be operational before late 1972 at the earliest. A MIRV with no more accuracy than the present SS-9 Mod 1 or Mod 2 could eventuate from the current Mod 4 program by late 1971.

3. *Land-Mobile ICBMs.* The Soviets will probably continue work on these, but it remains to be seen how extensively they may deploy them. There are many difficulties of maintenance, security, transportation, and the like which cause us to believe that the Soviets might have doubts about the practicability of such a system. In any event we would not expect it to become operational before 1975.

W. With respect to submarines, the Soviets will almost certainly continue to increase their Y-class fleet at the rate of about eight per year, for some time to come. Meanwhile, a new missile, the SS-NX-8, has been undergoing flight tests at a deliberate pace since June of 1969. Its range is indicated to be about 3,000 n.m., a substantial improvement over the missile presently carried by the Y-class. A puzzling aspect, however, is that the SS-NX-8 appears too large to be fitted into the Y-class. Moreover, we have no evidence of a new submarine class designed to carry this missile. We think it likely that, at a minimum, the SS-NX-8 will be deployed on 10 modified diesel-powered G-class units. Evidence is insufficient, however, for us to make a confident estimate as to the nature or extent of any further deployment. By about 1975 Soviet submarines could have missiles equipped with multiple warheads or penetration aids; the system CEP would probably be about 0.5 n.m. or worse.

X. The fleet of intercontinental manned bombers will probably diminish in numbers gradually until at least 1975, when the new [ ] could begin to enter operational units. We believe that the [ ] is best suited for peripheral operations, but that it has some capability for intercontinental attack. All but the Air Force believe that our knowledge of this aircraft is still too limited to jusify a confident judgment of its capabilities and future employment. The Air Force believes that the capabilities of [ ] as now assessed, indicate a Soviet intent to employ the aircraft in both intercontinental and peripheral operations.

* * * *

Y. The various uncertainties summarized above make it evident that no exact estimate of the future Soviet force structure, at least after about the end of 1972, could be defended. We have therefore constructed, in Section XII of this Estimate, several illustrative models to depict various possibilities. The first, called Force A, represents little more than a completion of programs presently under way; it seems highly unlikely that the Soviets would stop at this. Another model, Force D, is a sample of what we believe would be a maximum effort short of converting to a wartime basis; this also appears highly unlikely. Force C, without going as far as Force D, represents something the Soviets might undertake if they were to place top priority on the early acquisition of a capability to knock out virtually all of the US ICBM force; we also think this unlikely.[*]

Z. Between these outer limits of reasonable force structures we have set forth three others designated respectively B1, B2, and B3. These differ primarily in the rapidity with which the Soviets, either for technological or other reasons, deploy MIRVs, and they reflect also some differences in general force structure which would seem likely to obtain because of such differences in MIRV development. Our estimate is that Soviet intercontinental attack forces are most likely to fall somewhere in the area depicted by these B-models, but we wish to emphasize that these and the other models are strictly illustrative, and not to be regarded as confident estimates or as pro-

[*] Maj. Gen. Rockly Triantafellu, the Assistant Chief of Staff, Intelligence, USAF, does not agree with the judgments in this paragraph. For his views, see his footnote to Section XII, page 61.

jections for planning. As one moves beyond the next two years or so, all projections become increasingly uncertain; beyond five years they are highly speculative.[5]

[5] Maj. Gen. Rockly Triantafellu, the Assistant Chief of Staff, Intelligence, USAF, does not agree with the judgments in this paragraph. For his views, see his footnote to Section XII, page 61.

DISCUSSION

I. THE EVOLUTION OF SOVIET STRATEGIC FORCES

The Years of Strategic Inferiority

1. World War II marked the beginning of Soviet efforts to acquire a capability for strategic offensive operations. Several developments converged to impel the USSR in this direction. The nature of warfare had been profoundly altered by the extensive use of strategic bombardment. Breakthroughs in military technology—particularly in nuclear weapons, missiles, and electronics—promised even more dramatic change for the future. And, although the Soviets in any case would have moved to exploit the new technology, the drastically altered political and military balance that emerged from the war provided an urgent incentive. The USSR emerged from the war second only to the US as a great power. Its interests and ambitions brought it into direct conflict with the opposing power of the US, and Soviet military planners were forced for the first time to think in intercontinental as well as continental terms.

2. The Soviets pushed research and development (R&D) in every field of strategic weaponry. We know that by 1945 their nuclear weapon program was well under way. Late in the war they overran the German missile center of Peenemunde, which provided them the technological base for an intensive effort in this field; by the fall of 1947, the Soviets had built the ballistic missile test center at Kapustin Yar and had conducted several test firings of captured V-2s. Work was also under way on strategic aircraft. In addition to a strong native design effort, Soviet technicians were copying the US B-29, a few of which had fallen into Soviet hands late in the war. At the close of the 1940s, the USSR had tested its first nuclear weapon and had fielded its first strategic delivery system, the TU-4 piston medium bomber, which was to be deployed in large numbers. But although the Soviets had

broken the US strategic/nuclear monopoly, they had not overcome the US lead.

3. The buildup of Soviet strategic forces began with those for Eurasian operations. That it did was probably in large measure a function of the learning curve. The USSR was exploring a new technology (indeed several new technologies), and it was easier to meet strategic requirements in Eurasia than to develop capabilities for intercontinental attack. Beginning in the mid-1950s, the Soviets undertook the replacement of the TU-4 with the TU-16 jet medium bomber (the Badger) and commenced the deployment of medium-range ballistic missiles (MRBMs) and, in the early 1960s, intermediate-range ballistic missiles (IRBMs). Several factors probably account for the massiveness of the strategic forces that were eventually arrayed against Europe: the traditional Soviet concern with Europe reinforced by the heavy losses of World War II, the Soviet penchant for over-insurance, and the new threat which the Soviets perceived in the formation of NATO. Finally, and perhaps most important, the Soviets probably hoped that strategic forces which held Europe hostage would deter the US until they could develop strong forces for intercontinental attack.

4. By the early 1950s, the Soviets were working on a variety of weapon systems for deployment against the US: ballistic missile submarines, heavy bombers, and intercontinental ballistic missiles (ICBMs). In terms of actual deployment, the first results were meager. Only a few of the first nuclear-powered ballistic missile submarine (SSBN), the H-class, were produced. There is some evidence that the Soviets had planned to deploy the new heavy bombers, the Bison and the Bear, in larger numbers, but several factors combined to limit deployment: problems with the aircraft; a strengthening of US air defenses; and, most important, the first successful test of the SS-6 ICBM. The SS-6 was unsuitable for large-scale deployment, but it came along shortly after Khrushchev, a missile enthusiast, had consolidated his power. Khrushchev sought to wring the maximum political effect out of this achievement.

5. The development of a strategic weapon against which the US had no defense would in any case have been of great significance. But to Khrushchev, it marked a watershed in international relations—a tipping of the strategic balance which he tried to exploit before it had in fact occurred. His extravagant claims could not at that time be disproved by US intelligence, and he sought to turn the overestimates of Soviet strength to his advantage in his demands for a settlement of the Berlin problem. In 1961, however, we realized that the Soviet ICBM force was both highly vulnerable and much smaller than had been believed. Meanwhile, the US, alarmed by the Soviet ICBM threat, had undertaken a massive and rapid buildup of its own strategic missile forces.

6. It was in this situation that Khrushchev, early in 1962, decided to deploy ballistic missiles to Cuba. The solution to the problem was typical of the man. It was a quick fix, similar to his "virgin lands" policy. At one stroke, he would improve the USSR's strategic position and increase its bargaining power at negotiations on Berlin (which he had thoughtfully suggested should be delayed until after the US elections of November 1962). It was, of course, Khrushchev's major miscalculation, and one that contributed to his fall from power; he had assumed that the move would go undetected until it was completed, he had underestimated the will of his adversary, and he had not taken account of the overwhelming conventional superiority of the US in its own backyard.

The end result was an ignominious Soviet retreat. But the episode had important effects on Soviet programs to build forces for intercontinental attack.

The Post-Cuban Re-examination of Policy

7. Even before the Cuban missile crisis of October 1962, there was evidence that the Soviet ICBM program was the subject of re-examination and revision. For example, the deployment of the SS-7 and SS-8 never reached the levels which we believe were originally intended. The Soviets had evidently concluded that these systems were inadequate to meet their strategic requirements.

8. In the aftermath of the Cuban crisis, the Soviet leaders must have seen the building of a more impressive deterrent as the immediate requirement. This meant large, survivable forces that could launch a devastating attack in retaliation. The second major requirement was political in origin, but no less pressing: to emerge from the position of strategic inferiority that the USSR had occupied for nearly 20 years. Thus, in 1964 the Soviets launched the massive buildup of strategic missile forces for intercontinental attack that is still in progress.

9. This buildup has entailed a sustained, high-priority effort for much of the past decade. It has involved the extensive deployment of three weapon systems that were under development in the early 1960s: the relatively small SS-11 ICBM, which now makes up the bulk of the force; the SS-9, the largest and most powerful Soviet ICBM; and the 16-tube Y-class ballistic missile submarine, the Soviet counterpart to Polaris. Deployment of the SS-13 solid-propellant ICBM has been limited. In terms of new group starts the Soviet ICBM buildup probably reached a peak about 1965-1966; until recently it remained at a fairly high and constant level, but there is now some evidence of a slowdown. We believe that production of ballistic missile submarines reached a new high in the past year.

The Present Strategic Relationship

10. Over the past several years the USSR has worked a dramatic improvement in its strategic position relative to the US. As recently as 1966, the Soviets almost certainly credited the US with a clear superiority; from a worst case point of view, they would have had to reckon that their ICBMs and bombers were highly vulnerable to a US surprise attack and that their small missile submarine force was by itself inadequate for deterrence. Now, although lacking an intercontinental bomber force comparable to that of the US, they have surpassed the US in numbers of ICBM launchers and within the next few years could overtake the US in SLBMs[6] as well. They have not only built a formidable deterrent but they have achieved a position that they evidently regard as one of strategic equality with the US.

11. It has been evident for some time that an important Soviet objective has been the achievement of a position of acknowledged strategic parity with the US. Soviet acceptance of strategic arms limitation talks (SALT) was intended in part to secure US recognition of this parity. But Soviet interest in being regarded on a par with the US extends beyond the SALT context: the USSR's objective is to establish its equality with the US as a great power on the world scene.

12. There remains a question as to how the Soviets define equality. Like the US, the Soviets apparently measure the strategic relationship in a variety of ways. We have no evidence that the Soviets have sought to meas-

[6] The term "SLBM", when used in this paper, is meant to refer only to submarine launched ballistic missiles.

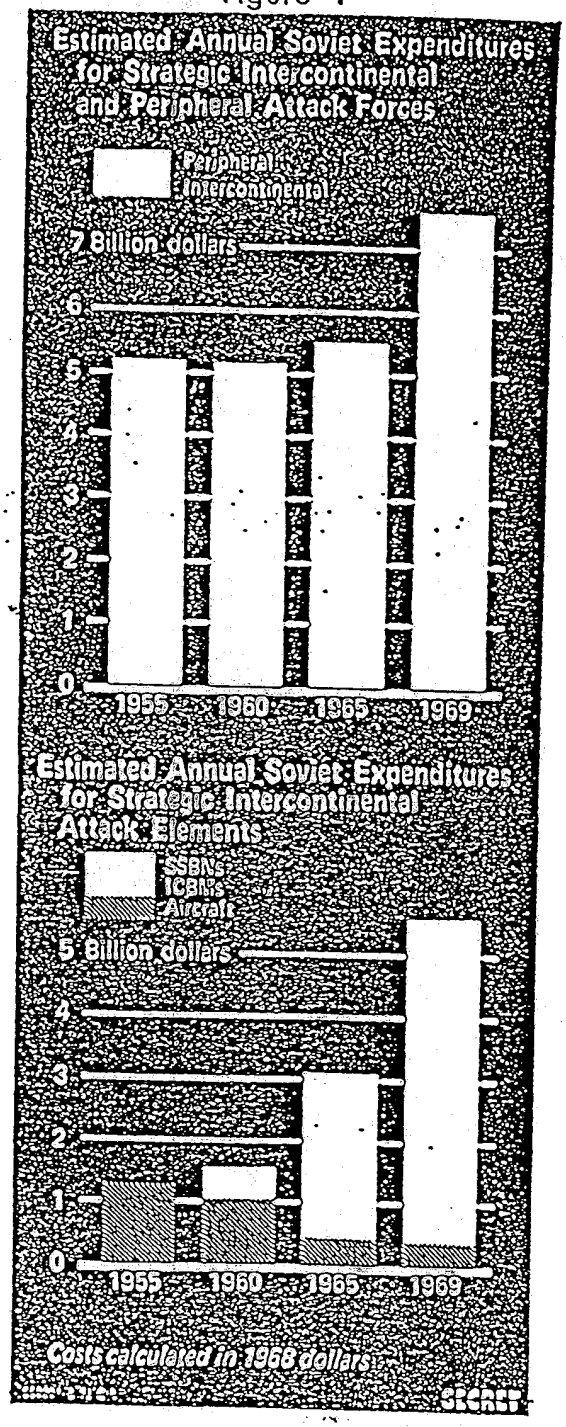
ure relative strengths of the US and USSR using terms such as total throw weight, megatonnage or equivalent megatonnage. We know [ ] however, that computer war games have been used in determining relative force capabilities. Such analysis is comprehensive and takes into consideration quantitative and qualitative characteristics of the forces and potential targets as well as the defensive capabilities of the enemy. On the other hand, [ ] some Soviet military men still tend to think as though they were counting "rifles and cannons" and pay insufficient attention to qualitative factors when looking at strategic forces.

13. In any event, equality, for all practical purposes, has been substantially achieved. While the USSR has not attempted to match the US in numbers of heavy bombers, it has compensated by building an ICBM force substantially larger than that of the US and is making a determined effort to catch up with the US in SLBMs. Moreover, a number of qualitative improvements are being tested which will improve the capabilities of Soviet strategic attack forces considerably.

Overall Magnitude and Costs of the Program

14. One overall representation of the magnitude and pace of the buildup of strategic intercontinental attack forces is the pattern of expenditures for deployment and operation of these forces. (See Figure 1.) In the mid-1950s the initial expansion in spending mainly reflected deployment of Bear and Bison bombers. During the period from the early 1950s to the early 1960s total strategic attack spending was concentrated on the peripheral attack forces—medium bombers and MRBM and IRBM systems.

Figure 1



15. In the early 1960s Soviet expenditures for intercontinental attack forces accelerated rapidly as the USSR began to deploy ICBMs. The SS-7 program in particular pushed spending to a peak in 1963. Spending declined in 1964 and 1965, as SS-7 deployment ended, then rose sharply again in 1966 and 1967 as the SS-9, SS-11, and the Y-class submarine programs hit their stride. From then on it consistently surpassed spending on peripheral forces. Outlays for intercontinental attack reached a new high in 1967 and have remained at about that level since.

16. Although total defense spending grew during the 1960s, outlays for intercontinental attack forces grew faster than the total so that the share doubled from about 5 percent in 1960 to more than 10 percent in the late 1960s. The 1969 level of spending—2.3 billion rubles (the equivalent of about $5.6 billion) [1]—is almost four times as high as the 1960 level. For the decade as a whole spending accumulated to about 16 billion rubles ($36 billion). ICBMs account for about 80 percent of this amount.

17. Three weapon systems deployed during the latter half of the decade—the SS-9, SS-11 and the Y-class submarine—dominated spending during the 1960s, accounting for nearly half the total for intercontinental attack forces. The estimated outlays to date for the SS-9 and SS-11 programs are roughly equal—approaching 3½ billion rubles for each (more than $6 billion)—even though about three SS-11s have been deployed for each SS-9. Moreover, if the Y-class program reaches a level of about 50 submarines, its total costs would be about the same as for the SS-9 and SS-11 programs.

[1] The dollar figures (appearing in parenthesis after the rubles) are approximations of what it would cost to purchase and operate the estimated Soviet programs in the US.

18. The fastest rising component of Soviet defense spending during the 1960s has been outlays for military research, development, test and evaluation (RDT&E) including R&D for military space programs. These expenditures increased from about 20 percent of the total in 1960 to about one-third in 1969. Although we are unable to separate out with confidence the RDT&E costs of particular weapon systems, it seems clear that RDT&E programs for intercontinental attack programs have been an important contributing factor to this rapidly rising trend in RDT&E expenditures, and thus to the overall growth of military costs over the decade. An important by-product of these expenditures on building up intercontinental attack forces during the 1960s has been the creation of large R&D facilities, such as the Tyuratam test center, which are capable of supporting continued expansion of Soviet intercontinental attack capabilities.

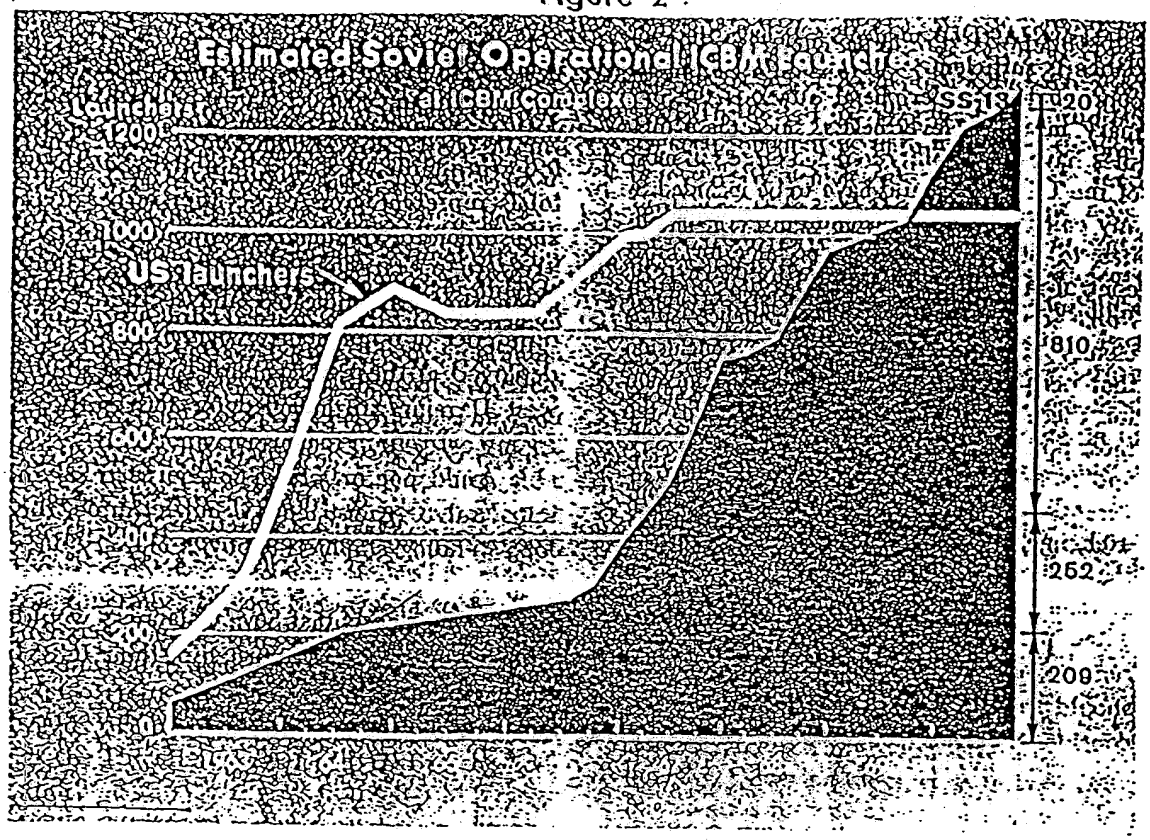
II. INTERCONTINENTAL BALLISTIC MISSILE DEPLOYMENT

Current Status

19. The Soviet ICBM force presently consists of 5 operational systems, deployed at 24 operational ICBM complexes. We believe that the SS-11, as will be discussed below, is also deployed at one MRBM and one IRBM complex. We believe that construction of launch facilities is continuing at all 6 SS-9 complexes, at 5 of the 10 regular SS-11 complexes as well as at the MRBM and IRBM complexes mentioned, and at the single SS-13 complex. SS-7 and SS-8 construction ended in 1964. There are also ICBM launchers at the test ranges at Tyuratam and Plesetsk [2] (See Table on page 18.)

[2] We believe that the ICBM launchers at Plesetsk are entirely devoted to R&D, space and troop-training activities and we no longer count them in the operational force.

Figure 2 :



20. As of 1 October 1970 the Soviets had an estimated 1,291 operational ICBMs at regular ICBM complexes. (See Figure 2.) SS-9s are deployed in groups of six launchers, and the SS-11 and SS-13 in groups of 10 launchers. Assuming no phaseout of older systems, the Soviets will have a total of 1,445 regularly deployed operational ICBMs when groups under construction are completed, probably by mid-1972.

21. We estimate that the Soviets also have about 80 launchers, the majority of them located at the test ranges and the remainder at the regular SS-9, SS-11, and SS-13 complexes, which are used for training launch crews. All of these presumably have an emergency operational capability against the US. In addition, there probably are about 15 R&D launchers at the test ranges which might be so employed.

22. Account must also be taken of the SS-11s which we believe are being deployed at two complexes in the southwest Ukraine originally devoted only to MRBMs/IRBMs. We estimate that 80 were operational on 1 October 1970 and that an additional 40 will be complete by mid-1972.

23. There is complete agreement that these SS-11s can attack either peripheral targets or targets in the US. There is dispute, however, as to which is the primary mission of these

SS-11s. *CIA, DIA, and NSA* believe the evidence is sufficiently convincing to permit the conclusion that peripheral attack is the primary mission. Nevertheless, since these missiles have a capability to reach targets in most of the US, they would have to be included in any calculations of maximum Soviet capabilities to attack the US—especially for arms control purposes. *State, Army, Navy, and Air Force* do not consider the evidence sufficiently convincing to permit the conclusion that peripheral attack is the primary mission for these SS-11s. Since the US remains the most powerful strategic opponent of the USSR and is the only nation that could inflict severe damage upon the Soviets in a nuclear exchange, they believe it prudent to assume that the Soviets would elect to have weapon systems with intercontinental capabilities targeted primarily against the US with the option to change to peripheral target areas should the contingency arise. They therefore consider them part of the ICBM force.

24. The total number of ICBMs which could be targeted against the US, both now and when the construction we believe is now under way is completed, is summarized in the following table. It should be noted that these totals represent gross capabilities rather than an estimate of the numbers which are in fact likely to be targeted against the US at any given time. As indicated above, there is a difference of opinion as to whether the SS-11s deployed at the two complexes in the southwest Ukraine are intended for this purpose. In any case, all of the missiles nominally available could not or would not be used in an initial salvo against the US. For example, the long-standing emphasis of Soviet military doctrine on maintenance of substantial reserve capabilities suggests that Soviet planners would wish to withhold some portion of their ICBM forces from an initial attack in order to take care of contingencies.

ESTIMATED SOVIET ICBM LAUNCHERS
1 OCTOBER 1970—MID-1972

	Deployed Forces		Other
	1 October 1970	Mid-1972	
Soft			
SS-7	124	124	Training Launchers About 80
SS-8	10	10	R&D Launchers About 15
Total	134	134	Total about 95
Hard			
SS-7	66	66	
SS-8	9	9	
SS-9	252	306	
SS-11	810	850	
SS-13	20	80	
Total	1,157	1,311	
Total	1,291	1,445	
SS-11 at MRBM or IRBM complexes	80	120	

III. GENERAL CHARACTERISTICS OF SOVIET ICBMs

25. Despite the diversity of operational systems in the Soviet ICBM force (see Figure 3), certain generalizations are possible about the force as a whole.

26. Payload capacity—i.e., total throw weight—is high compared to that of the US force, primarily because of the large size of the SS-9 but also because of the continued presence of significant numbers of relatively large SS-7s and SS-8s in the force. The total megatonnage that can be delivered by the Soviet force is also considerably greater than that of the US. The nuclear performance of Soviet warheads of one megaton and above, i.e., their yield-to-weight ratio, is believed to be generally at about the level of technology demonstrated in the final Soviet series of atmospheric tests in 1961-1962.[

]

27. The Soviet approach to system design has been quite different from that of the US, emphasizing simple subsystems and the use of off-the-shelf components of proven older systems. A classic example of this design concept is the relatively simple guidance technique used on all liquid-propellant missiles. This method features throttleable engines allowing thrust to be varied so the vehicle can fly a preprogrammed trajectory. Such a technique reduces the number of on-board computations required and eliminates the need for the large capacity digital computers used in US guidance systems. The net effect of this Soviet design philosophy has been the development of very reliable liquid-propellant ICBMs.

28. The Soviets have lagged behind the US in such qualitative improvements as multiple re-entry vehicles, penetration aids, and very high accuracy. Also, their re-entry vehicles (RVs) have reflected a different approach with respect to ballistic coefficients (betas).[9] The bluntness and correspondingly lower betas of Soviet RVs make them less accurate than US systems, and their larger radar cross-sections and slower atmospheric descent times make them more vulnerable to detection and interception by an antiballistic missile (ABM) system. But their shape facilitates the design of compatible nuclear weapons, makes them more adaptable to hardening against the effect of radiation, and renders them less susceptible to being thrown off course by the effects of prior nuclear bursts in the impact area. The Soviets initially tested high beta RVs on both the SS-7 and SS-8 systems, and actually deployed the one on the SS-7. Following the nuclear tests of 1961, however, the ballistic coefficients of new RVs for both the SS-7 and SS-8 were reduced drastically, either in order to accommodate the newly tested warheads or in order to benefit from the other advantages of blunter RVs noted above. Until recently the ballistic coefficient of most Soviet RVs remained quite low compared to similar US vehicles.

29. We do not know to what extent, if any, the Soviets have hardened their RVs or guidance systems against the effects of nuclear radiation. As noted, the blunt shapes of Soviet RVs makes them more adaptable to hardening than US RVs. Similarly, Soviet guidance systems would be inherently easier to harden against nuclear radiation because of the lack of on-board computers and the use of simple electronic circuitry.

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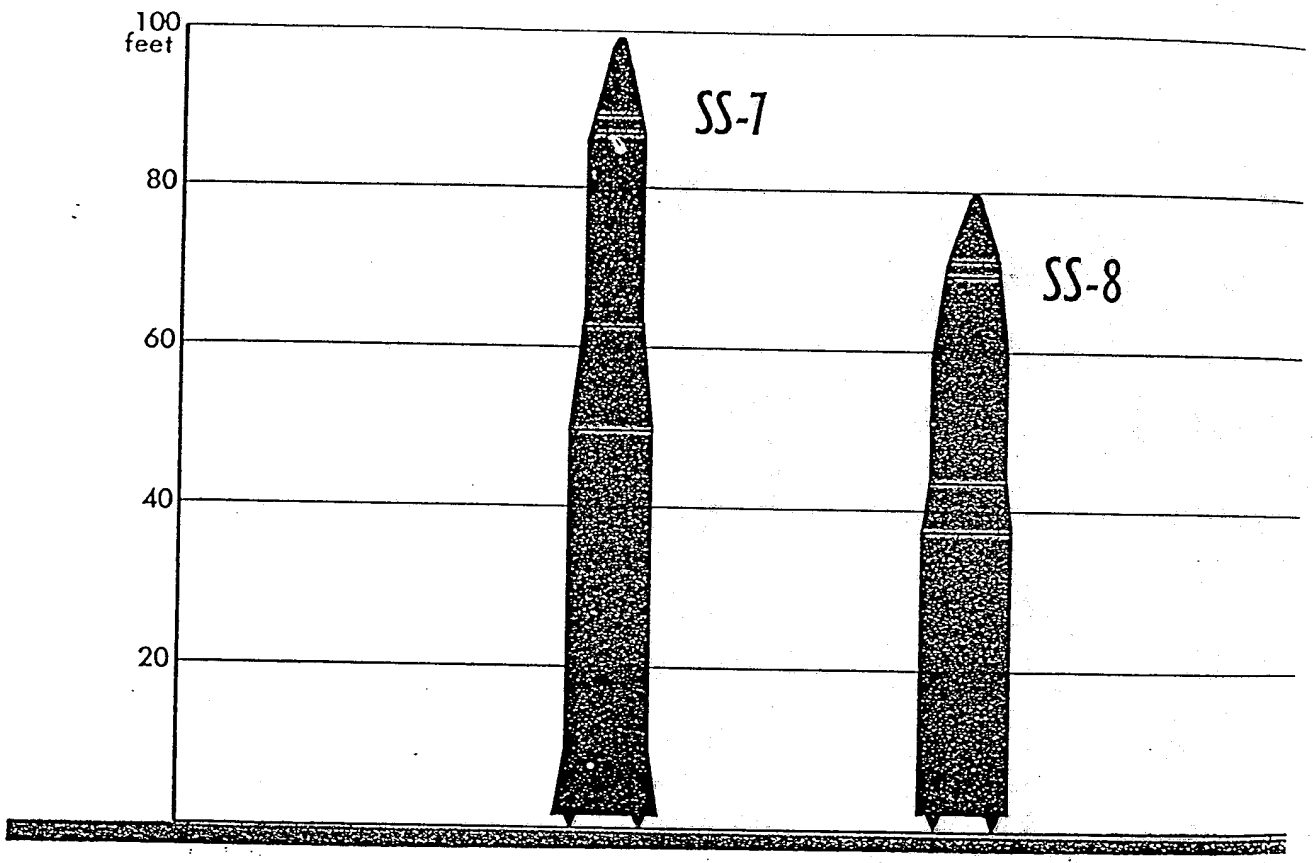
[9] See Glossary, Annex A, for definition of ballistic coefficient.

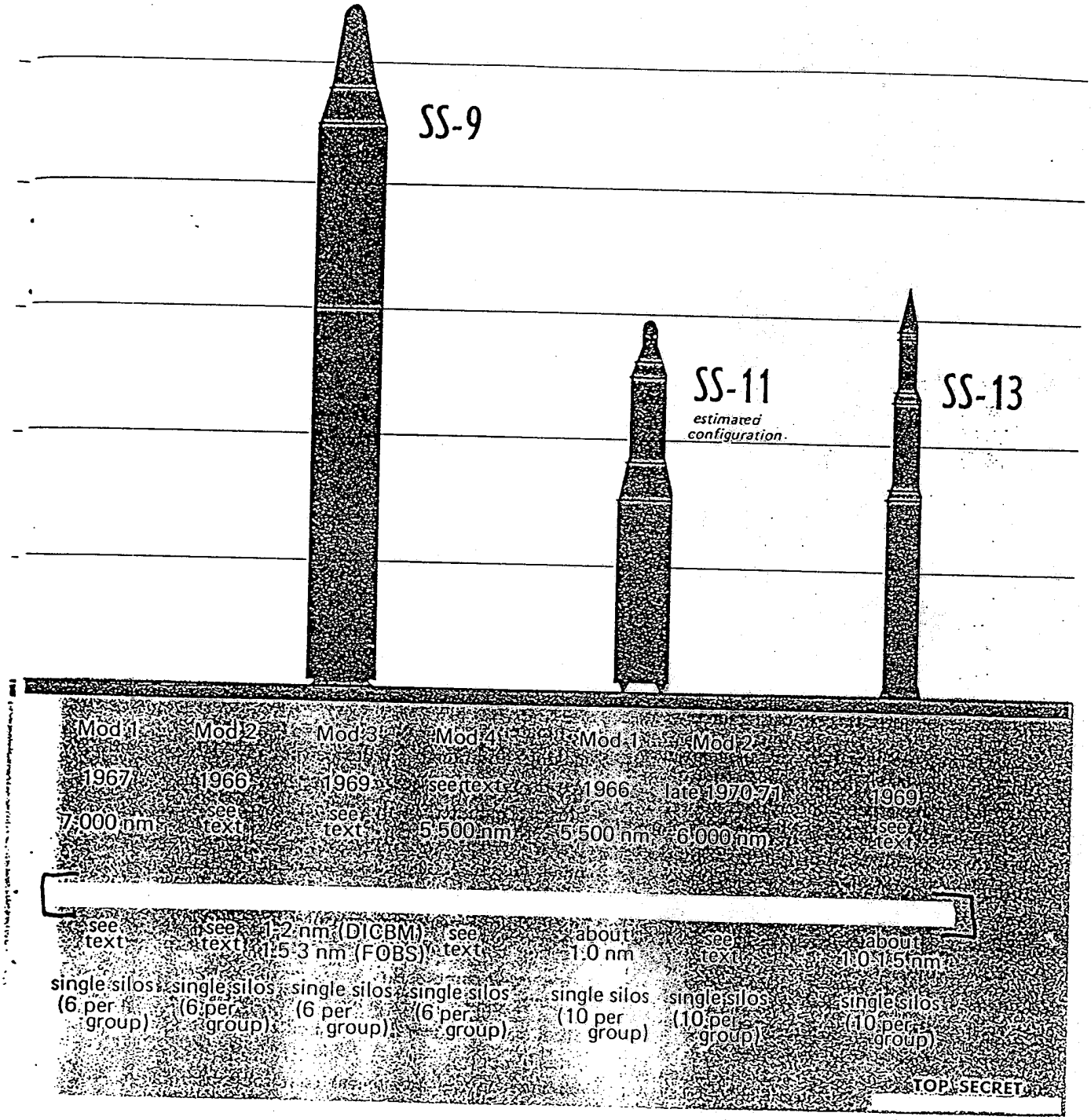
Comparison of Soviet ICBMs



	Mods 1,2	Mod 3	
Year Operational	1962-63	1963	1963
Maximum Operational Range (NRE)	6,500 nm	5,500 nm	6,000 nm
Warhead Yield	[		]
Accuracy (CEP)	1.0-1.25 nm	1.0-1.25 nm	1.0 nm
Deployment Mode	soft pads or triple silos	soft pads or triple silos	soft pads or triple silos

560096 1-71 CIA

Figure 3



30. The Soviets have shown a continuing interest in reducing the time it takes to bring their ICBM force to full readiness. A Soviet general reportedly stated in early 1969 that considerable progress has been made in this area, indicating that Soviet ICBMs could be readied for launch in several minutes. This agrees with our technical assessment that the SS-9 can be readied in 3 to 5 minutes, the SS-11 within 3 minutes, and the SS-13 in less than 2 minutes.[10] These times assume, however, that the gyrostabilized platform in the missile guidance system is continually operating. If it is not, it probably would take up to 25 minutes to prepare missiles for firing. In the US, gyros normally are operated continuously; this practice involves more frequent recalibration or replacement of the gyros.

31. Most of the Soviet ICBM force is deployed in hardened and dispersed single silos, although the 209 SS-7s and SS-8s are still on soft pads or in groups of three hard launchers each. Because of lack of data, past estimates of the hardness of Soviet silos were stated in terms of design overpressure, i.e., the level of overpressure they were designed to withstand and remain completely operable. No valid estimate could be made as to how much overpressure would be required to assure specified levels of damage to the force.

32. During the last two years, major new studies of hardened launch and control site vulnerability have been undertaken under the separate auspices of CIA, DIA, and the Air Force in an attempt to provide the additional information on hardness. Of particular interest to targeting is the point representing the overpressure that would render inoperable 50 percent of the targets. Despite gaps in the data and the differing methodologies used in the various studies, the differences in the results are very small and there are agreed values as shown in the following table:

FACILITY	REQUIRED PEAK OVERPRESSURE* (*pounds per square inch*) From 1 MT Weapon
SS-7 and SS-9 Silos	500
SS-9 Launch Control Center	500
SS-11 Silos	700
SS-11 Launch Control Center	500
SS-13 Silos	1,100
SS-13 Launch Control Center	950–1,350

[redacted]

33. It is emphasized that the above hardness figures are for silos and launch control centers *only*, and for these structures considered *in isolation;* the figures do not reflect the vulnerability of the various missile systems as a whole. Other components could make the systems more vulnerable than are the silo alone or the launch control center alone. Unfortunately, much of the data required for making additional studies is not available. We do not know, for example, how the missiles are mounted in their silos; in particular, we do not know whether or how well they are shock mounted. The CIA study does indicate that if the SS-9 missile is *not* shock mounted, the required peak overpressure [redacted] could be as low as [redacted] for the silo-missile combination [redacted]

Studies so far have concentrated on silos and launch control centers. Further studies are planned on the missile-silo combinations for

[10] By comparison, the US Titan II can be readied in three minutes and the Minuteman in 39 seconds.

those missiles (e.g., the SS-9) where the available data promise to yield at least some useful information.

IV. THE SS-9

Introduction

34. The SS-9 warrants special attention in any consideration of Soviet forces for intercontinental attack. It is the only weapon now in the Soviet arsenal which could have the necessary combination of yield and accuracy to pose a threat to US land-based missiles and other hard targets. Estimates of SS-9 characteristics and capabilities have consequently assumed a unique importance, compared to those of other Soviet weapon systems, in their impact on US defense planning and on US thinking about requirements for an agreement limiting strategic arms.

35. The SS-9 is a product of the same design team that was responsible for developing the SS-7 ICBM, and it is a direct outgrowth of that program. Feasibility studies and preliminary design probably began in 1960-1961. It has been operational since 1966 and was first displayed publicly in the 7 November 1967 Moscow parade. It has been given the code name Scarp by NATO.

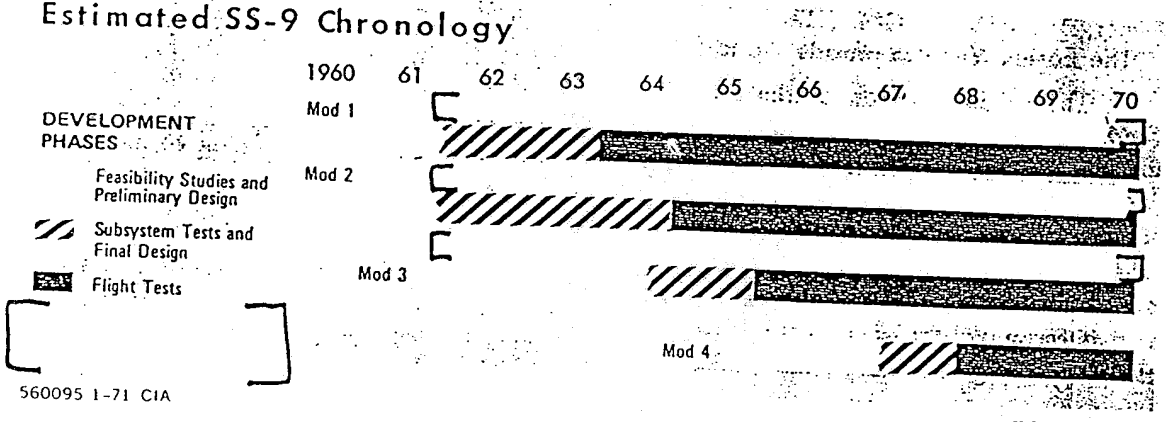
36. The SS-9 consists of two tandem storable-liquid bipropellant stages and a re-entry system. Both stages have thrust control and propellant utilization systems. The basic two-stage vehicle is essentially the same for all four variants of the SS-9 and, indeed, for a space booster version, the SL-11, as well. The primary differences among the variants lie in their payloads.

37. The SS-9 is unique among Soviet ICBMs in that it has gone through four distinct weapon development programs. (See Figure 4.) The first two variants, the Mod 1 with a single RV and the Mod 2 with a heavier single RV, are already deployed. Development of the Mod 3—which has been tested both as a fractional orbit bombardment system (FOBS) and as a depressed trajectory ICBM (DICBM)—appears to have ended, and two or three groups have probably been deployed. Development of the SS-9 Mod 4, which carries 3 RVs, has not yet been completed, and indeed, it has entered a new test phase. Meanwhile, work may be under way on still another variant.

38. The SS-9 was obviously designed to have greater accuracy and payload than its predecessor, the SS-7, creating a presumption that at least one of its major purposes was to provide a capability to attack hard targets. On

Figure 4

Estimated SS-9 Chronology



the other hand, the variety of modes in which it has been tested over the roughly 10 years since it first reached the drawing board raise questions about what additional mission or missions the SS-9 may have acquired and as to whether its missions have changed or are changing over time. The problems of understanding the SS-9 program are compounded by uncertainties about the missile's performance characteristics and by the need to rely on judgments or assumptions to resolve them.

39. A detailed review of the evidence and analysis underlying present assessments of the SS-9's characteristics and capabilities is presented below. In this review special attention is focused on four basic and contentious issues:

a. The *accuracy* of the system, which affects its potential for use against hard targets. This is a consideration of significance for all variants except the Mod 3, whose trajectory significantly lessens accuracy, and which is clearly not a hard target weapon.

b. The *range* of the heavier version, the Mod 2—specifically its capability to reach Minuteman complexes in the US.

c. The *capabilities* and likely mission of the Mod 3, particularly in the FOBS mode.

d. The *capabilities* and likely mission of the Mod 4.

The Earlier Versions--Mods 1 and 2

40. The original version of the SS-9, the Mod 1, was first test flown in December 1963 and followed a typical test program until early 1965. Between January and November 1965 there were no test firings of the SS-9 Mod 1.

[redacted] There is no indication, however, of any slowdown in the construction of SS-9 launch sites at operational complexes during the slowdown in test flights.

41. The second version of the SS-9, the Mod 2, carries a heavier RV than its predecessor—about 13,000 pounds compared with 9,500 pounds for the Mod 1. There is evidence of some urgency in the development program in comparison with that of the Mod 1; in fact, its timing suggests that the priority given to the Mod 2 caused the standdown in Mod 1 flight testing, although the Mod 1 had already been tested to operational range. First flown in April 1965 [11] during the lull in Mod 1 firings noted above [redacted]

A further indication of the importance the Soviets attach to the Mod 2 is [redacted]

[redacted]

[11] The Soviets had previously flight tested SS-9s with very heavy payloads in October 1964, quite early in the program, but the relationship of these payloads to the Mod 2 has never been established.

ing precise target and launch point locations in relation to each other and in predicting gravity conditions in between).

The Basic Problem of Accuracy

43. The two most important elements in determining the capability of a missile system against hard targets are the accuracy (CEP) [12] of the system and the yield of the warhead. Of these, the more important is the CEP. In the case of the SS-9, for example, a reduction in CEP of only 0.2 n.m. works a greater improvement in kill probability than does doubling the yield of the warhead. It is important, therefore, that the basis for deriving accuracy figures for the SS-9 be clearly delineated, including the uncertainties and requisite assumptions. The methods used to estimate SS-9 accuracy are summarized below.

44. The accuracy of the SS-9 cannot be measured directly, as was possible with the earlier SS-7 and SS-8 systems

System CEP, therefore, has been calculated by measuring or estimating the various factors that could reduce accuracy and subsequently combining these error contributions statistically. The primary factors involved are inaccuracies in missile guidance and control, deflections of the re-entering vehicle due to atmospheric conditions, and—to a lesser extent—geodetic and gravimetric (G&G) errors (i.e., inaccuracies in determin-

[12] Circular Error Probable. See Glossary, page 99, for definition.

be expressed as 0.6±0.1 n.m.

b. *DIA, Army and Navy Position:* The SS-9 Mod 1 and 2 are assessed to have a CEP of 0.5±0.1 n.m. This assessment is based on:

49. In the light of the uncertainties associated with the evidence and the assumptions to be used in analyzing system accuracy, significant differences of judgment among the USIB agencies continue. The various positions (all assuming a nominal ICBM range of 5,000 n.m.) are as follows:

a. *CIA and Air Force Position:* It would be misleading to quote only a single number for the accuracy of the SS-9 because a number of assumptions must be made and because the resulting CEP values can vary significantly. The SS-9 CEP should therefore

c. *State and NSA Position:* There are major uncertainties in determining what the actual Soviet accuracy is for the operational version of the SS-9. A CEP of about 0.5 n.m. is the best obtainable, but the actual accuracy would, in general, be somewhat poorer for operationally-deployed SS-9s.

CEP for the SS-9 is estimated as 0.5 to 0.7 n.m.

50. Except in the case of State and NSA, the agency positions noted above do not take account of operational degradation. In general, a missile is expected to be somewhat less accurate when fired operationally by the troops than when launched on a test range by R&D personnel. Continued handling of the missile and operation of the guidance components can cause a degradation, and operational crews are usually less experienced at maintaining calibration of the system. Soviet procedures and practices for minimizing these potential error sources under deployed conditions are unknown, however, and we cannot judge their effect on operational CEP.

Yield

51. Estimates of the yields of the different SS-9 warheads are based almost entirely on the estimated weight of the RV and the assessed yield-to-weight ratio of Soviet devices as derived from analysis of debris from atmospheric tests in 1961-1962. By analogy with US techniques of designing such weapons, approximately 70-80 percent of the Soviet RV weight is allocated to the nuclear system.

52. The effect of these differing estimates of accuracy and yields on the overall assessment of SS-9 capabilities can be determined from the following table, which summarizes in percentage terms the likelihood of disabling Minuteman launch silos and launch control centers with warheads of varying accuracy at yields compatible with a weapon system such as the SS-9. The table is based on the susceptibility of Minuteman launch facilities solely to airblast and ground shock with doors closed. It does not consider the effects of thermal and nuclear radiation, or of electromagnetic pulse.[13]

53. With a 0.5 n.m. CEP,

[13] See footnote [b] by Maj. Gen. Rockly Triantafellu, the Assistant Chief of Staff, Intelligence, USAF, to table on page 28.

it could be expected that some 65 percent of the SS-9 Mod 2s that the Soviets were able to target against Minuteman silos would knock out their targets. If the CEP were 0.6 n.m., however, only about 55 to 60 percent of the attacking missiles would accomplish their missions. If the CEP were no better than 0.7 n.m., the percentage of attacking missiles likely to accomplish their missions would be about 48 to 54 percent.[14]

54. Similar calculations can be made for attacks on launch control centers (LCCs), though 2 missiles would be required to achieve similar kill probabilities and these probabilities fall off more sharply as estimated accuracy declines. With a CEP of 0.5 n.m.

[14] See footnote * by Maj. Gen. Rockly Triantafellu, the Assistant Chief of Staff, Intelligence, USAF, to table below.

* Maj. Gen. Rockly Triantafellu, the Assistant Chief of Staff, Intelligence, USAF, believes that paragraphs 52, 53, and 54 could be misleading regarding Minuteman vulnerability to the SS-9. Overall, the USAF believes the Soviets would have to deploy several times the current number of SS-9 Mods 1 and 2—regardless of accuracies they could achieve—to pose a serious threat to the Minuteman force as a whole.

the expectation would be that some 60 to 65 percent of the LCCs that the Soviets were able to target would be knocked out.

the proportion of the targeted LCCs expected to be knocked out would be about 50 to 55 percent for a 0.6 n.m. CEP and about 43 to 48 percent for a 0.7 n.m. CEP.[15]

The Range Problem

55. The SS-9 with a 9,500 pound Mod 1 RV has been flight tested from Tyuratam to a range of 6,600 n.m. (NRE),[16] enough to reach targets anywhere in the US from any of the SS-9 launch complexes. The Mod 2, however, carries a payload of about 13,000 pounds. Because it uses the same first two stages as the Mod 1, it cannot fly as far. The difference in range is of a magnitude sufficient to raise questions about its capability and role. These questions have been the subject of considerable discussion and analysis and are taken up below.

56. The SS-9 has on two occasions demonstrated the capability to deliver the Mod 2 payload to 4,400 n.m. (NRE). This range is sufficient to reach only the extreme northwestern portion of the US from the area where we believe the closest SS-9 deployment complex is located.

57. To attack major US targets, and particularly the Minuteman complexes, the SS-9 Mod 2 must obviously be capable of attaining greater range than has been demonstrated. Analysts have therefore searched for ways that the range of the Mod 2 could be increased beyond that actually demonstrated in flight test.

[15] See footnote [b] by Maj. Gen. Rockly Triantafellu, the Assistant Chief of Staff, Intelligence, USAF, to table on page 28.

[16] The actual range of these firings was 7,100 n.m., but included effects of the earth's rotation which in this case added an increment of about 500 n.m. Ranges quoted herein, therefore, are expressed in terms of non-rotating earth (NRE) distances. Ranges achievable in operational firings northward to the US from the USSR are in some cases increased, in some cases decreased, as a result of the earth's rotation, depending on the specific launch points and target directions involved.

61. Disagreement as to how much weight can be saved by removing test instrumentation and as to how far the Soviets would consider it safe to go in minimizing propellant residuals results in substantial differences over the SS-9 Mod 2's maximum range. In sum, the positions are as follows:

a. *CIA, NSA, State, Army, and Navy Position:*

it is estimated that the maximum range capability of this variant is about 5,000 n.m. (minimum energy, NRE). This range would probably be adequate for targeting 5 of the 6 Minuteman wings from at least some SS-9 complexes.

b. *DIA and Air Force Position:* The SS-9 Mod 2 is assessed to have a maximum operational range of about 5,400 n.m. This variant was clearly developed to provide the greatest lethality (highest warhead yield and lowest CEP combination) of any Soviet strategic missile. It is difficult to rationalize an intentional Soviet design of their best hard target system which would preclude reaching all Minuteman Wings. [

] there is considerable variation in assessment of the maximum operational range of the system.

The Mod 3 (FOBS/DICBM)

62. In December 1965, the Soviets test fired the third variant of the SS-9, previously called the SS-X-6 and now designated the Mod 3. The Mod 3 has been successfully test flown in two modes. In one, the RV is deboosted from a low earth orbit into an impact area on the Kapustin Yar test range after less than one revolution (the FOBS mode). In the other, it is fired into an ICBM trajectory with a very low apogee and deboosted just prior to re-entry into the Kamchatka impact area or the central Pacific (the DICBM mode). Because of the low trajectory, any SS-9 Mod 3 launched northward toward the US would be detected much later by the Ballistic Missile Early Warning System (BMEWS) than would an ICBM flying a conventional trajectory, and the warning time to the US would be cut from about 15 minutes to 10 minutes or less, depending on the location of the target. A southward launch into orbit with deboost over the US would be coming from the wrong direction to be detected by BMEWS. However, US sensors nearing deployment promise to provide early detection of launches regardless of their firing direction.

63. A large amount of data is available on the SS-9 Mod 3 from the 22 firings of the system to date. It is quite clear from the evidence available that the basic SS-9 ICBM configuration is used for the Mod 3 with some minor modifications [

] The total payload weight is about 9,000 pounds, near that of the 9,500 pound Mod 1, but the RV is less than half as large (3,000-4,000 pounds), with the deboost propulsion stage accounting for the bulk of the throw weight. The deboost stage imparts a velocity of about 5,400 feet per second to the RV, which results in a deorbit in the FOBS mode and a steeper re-entry angle for the DICBM. [

]

64. The same type of error analysis as that performed on the Mod 1 and Mod 2 ICBMs indicates that the Mod 3 has a CEP about 1.0 to 2.0 n.m. when fired as a DICBM or FOBS in a northerly direction to the US. The CEP of a southerly-launched FOBS would increase to 1.5 to 3.0 n.m. because of the longer flight time. These levels of accuracy make the SS-9 Mod 3 incapable of attacking hard targets with any reasonable probability of success. On the other hand, the trajectory shape connotes a desire to deliver an attack with less time for the enemy to react. These factors in combination suggest strongly that the Mod 3 was designed to attack strategic time-urgent soft targets, such as SAC bomber bases and command and control facilities.

65. There have been certain puzzling aspects of the SS-9 Mod 3 program. [

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68. As in the case of the SS-9 Mod 2 range capability, USIB agencies are divided in their assessments of the Mod 3 program.

a. *State and CIA Position:* The SS-9 Mod 3 as tested does not have sufficient energy to allow its use against the US as a FOBS.

[would provide a FOBS capability only against the eastern seaboard. The Soviets would not undertake a development program for a system with such an extremely limited capability. The SS-9 Mod 3 does have the capability to be used as a DICBM to attack the US from the north on a depressed trajectory that would reduce US early warning time, and it is probably deployed in that mode. Deployment will probably be limited.

b. *NSA, Army, Navy and Air Force Position:* The SS-9 Mod 3 has a dual capability for use as either a DICBM or FOBS.[

] would allow a sufficient increase in range to permit coverage of the eastern seaboard as a FOBS. Thus it could be used as a DICBM for CONUS attack from the north or as a FOBS for attack from the south against targets located on the eastern seaboard. The system probably will not be extensively deployed and additional R&D firings are not expected.

c. *DIA Position:* The SS-9 Mod 3 is believed to be capable of first-pass attack on the entire CONUS in either the south-launched FOBS or the north-launched DICBM modes. The north-launched DICBM capability has been demonstrated. The south-launched FOBS capability is open to greater uncertainty.[

]

[

] would provide coverage of the entire CONUS in a south-launched FOBS mode.[

] It is not expected that the Mod 3 will be extensively deployed.

The Mod 4

69. The SS-9 Mod 4 is the latest in the series of SS-9 variants to be tested. Between August 1968, when the test program began, and April 1970, 17 firings of the system were detected, of which at least 15 and probably 16 were successful. This phase of the test program included launches both to Kamchatka and to extended range in the Pacific.

70. The three RVs[

] impact pattern approximates an isosceles triangle, the base of which is roughly perpendicular to the missile ground trace and is about 10 n.m. wide at operational ranges. It is quite clear that during this phase of the program the impact pattern did not vary significantly, which would be required for independent targeting of the RVs, and that the Mod 4, as tested, was not a multiple independently targetable re-entry vehicle (MIRV) system. Furthermore, it is evident that the guidance system employed on the SS-9 on

these tests—the same as that on the Mod 1 and Mod 2—could not provide the three RVs with the accuracy required to produce a high kill probability against hardened targets such as Minuteman in either a multiple re-entry vehicle (MRV) or MIRV role. Both the duration of the flight test program and the number of flight tests were consistent with complete Soviet R&D test programs.

we presume that it has not been operationally deployed, though it could be at any time.

71. After a six-month hiatus, testing of the SS-9 carrying three RVs was resumed in October 1970, and four tests were conducted in a period of less than four weeks.

One of these was an R&D test similar to the first 17 firings of the Mod 4, and another failed in flight. On the other two tests,

The data on both these tests have not been completely analyzed, but it appears that the Soviets are testing a MIRV.

72. A system of the type implied by these tests would have the capability to attack independently three separate targets. The down-range spread can probably be varied

The cross-range spread can also be varied, but the variation is limited to no more than 10 miles

Significant variations within this cross-range limitation

would be necessary if the system were to have any appreciable degree of attack flexibility.

73. We have not yet been able to determine whether the Soviets are attempting to improve guidance accuracy in the latest tests. If they decide to deploy a MIRV system of the type suggested by these tests, using the present SS-9 guidance system, they could probably begin deployment in late 1971. Under these conditions, the CEP of each of the three RVs could be essentially the same as for the SS-9 with a single RV, but could not be better. If a new guidance system is under development, deployment of the system could probably not begin before late 1972 at the earliest.

74.

We estimate that the payload weighs somewhat over 12,000 pounds—on the order of 700-1,000 pounds less than the SS-9 Mod 2 RV—and consists of three RVs and a separation mechanism. Each RV is estimated to weigh about 3,500 pounds and to carry a warhead with an estimated yield of

75. The Mod 4 with the payload described above has been flight tested to a range of 4,700 n.m. NRE

This range would allow it to cover targets only in the northwestern portion of the US.

[ ] there would be a maximum range capability of about 5,500 n.m. NRE for the Mod 4, sufficient to cover most of the likely targets in the US.[

] because of the lesser payload of the Mod 4, it is much easier than in the case of the Mod 2 to come up with ways in which the range demonstrated during flight tests can be lengthened to cover most of the US.

Roles and Missions of the SS-9

76. As we have seen, insufficient or inconclusive evidence on the performance of the missile has led to considerable disagreement about the capabilities of the SS-9 missile system. The questions of accuracy and range are of major concern since they bear most directly on the missions for which the various SS-9 modifications are intended. Do the Mod 1 and Mod 2 have sufficient accuracy to attack hard targets with a high probability of kill? In what way, if at all, do range limitations affect the use of the Mod 2 against US targets? With such questions unresolved, it is difficult to arrive at firm judgments on the roles and missions of the SS-9.

77. *The SS-9 Mod 1 and Mod 2.* There is general agreement that the SS-9 was initially developed to provide better accuracy and a larger payload than the SS-7, presumably for use against hard targets. Moreover, it seems highly unlikely that the Soviets would develop and deploy a weapon as uniquely powerful and expensive as the SS-9 (each costs roughly three times as much as an SS-11), if it were not to be assigned a mission for which smaller missiles are less suitable. Such evidence as we have suggests that at least initially, most SS-9s had US ICBM complexes as their primary targets.

78. It is possible that the Soviets originally deployed the SS-9 force against US LCCs. But as early as 1961, the Soviets probably knew of US plans to establish an airborne command post. Also, a report[

]indicates that the Soviets had intended to develop a capability to attack individual silos. It states that the Soviet generals, who had not believed that the US would deploy Minuteman in the numbers it did, were forced to recognize the impracticability of attacking silos when satellite photography of 1962-1964 revealed the extent of US deployment. At any rate, according to[

] there was a shift in Soviet targeting strategy about 1964. It states that "Soviet strategists . . . concluded that they should plan to attack US economic and administrative centers rather than rocket bases."

79. We do not know whether such a shift in fact occurred. Some subsequent developments in the SS-9 program can be interpreted as evidence that it did. In 1965, the Soviets abandoned a guidance system which permitted radio corrections in favor of an all-inertial system. On the other hand, improvements in all-inertial guidance may have made it unnecessary to use a radio-inertial system, particularly since a radio-inertial system is more expensive, more vulnerable to enemy attack, and less flexible operationally. Moreover, in 1967 Marshal Krylov, commander of Soviet Strategic Rocket Forces, stated that the targets for his forces included the enemy's means of strategic nuclear attack.

80. As noted earlier, there are various views about the range of the Mod 2. There is general agreement, however, that the Mod 2 has the potential to reach more US targets than it has demonstrated in flight tests; the differences concern how many. It is difficult to believe that the Soviets would so modify their most formidable ICBM that it could not be used against the USSR's principal nuclear adversary, the US. Moreover, there is no apparent reason to earmark it for peripheral attack. Europe would appear to be more than adequately covered by other missile systems. As to China, it is true that only a few MRBMs/IRBMs at most can reach Chinese targets. It would be surprising, therefore, if some portion of the ICBM force were not available for use against China, but it seems unlikely that the SS-9 Mod 2 is earmarked for this mission.

81. We cannot determine with confidence the missions of the SS-9 Mod 1 and Mod 2, which we believe make up virtually the entire present operational SS-9 force. On the whole, however, it appears likely that the Soviets regard the SS-9 as a weapon for use against strategic military targets and that at least some, and perhaps the bulk, of the weapons now deployed are aimed at US ICBM installations. This is the most likely explanation we can now put forward for Soviet deployment in recent years of a considerable number of weapons having the combination of accuracy and yield of the SS-9 Mod 1 and Mod 2.

82. Even if much of the SS-9 force is in fact directed against US ICBMs, the Soviets have not yet deployed the SS-9 in sufficient numbers to provide any assurance of disabling more than a portion of the US launch facilities and may never do so. Such targeting would probably still make sense, however, from the Soviet military planners' point of view. It is often argued that in view of the immense destructive power of nuclear weapons, the development of capabilities for attacking the enemy's strategic forces is pointless in modern war unless his forces can be overwhelmed in a first strike. We believe that the Soviet military planner would regard this as an unduly passive, all-or-nothing approach. Given the unprecedented uncertainties of the nuclear battlefield, he would hope that such operations might significantly contribute to national survival. In a pre-emptive strike, he would probably seek to reduce the weight of enemy attack as much as practicable without necessarily eliminating all of it. Even in a retaliatory second strike, he might see need for some targeting against the enemy's strategic forces so as to deny his adversary the opportunity to undertake follow-up strikes, to repair weapons that failed to get off because of technical problems, or to continue use of facilities such as bomber and submarine bases.

83. *The SS-9 Mod 3.* There is general agreement that the SS-9 Mod 3 used as a DICBM can cover all US targets; there are differences of view as to whether and to what extent it could do so as a FOBS. In either role, however, it appears to be intended to degrade or circumvent the US missile warning system. In designing this system, the Soviets accepted reduced payload and accuracy in order to gain the advantage of a reduction in warning time. It was probably developed for use against soft, strategic, time-urgent targets.

84. *The SS-9 Mod 4.* The mission of the SS-9 Mod 4 is at this time unclear. Additional test data will be required before we can make a confident judgment.

V. THE SS-11

85. The SS-11, the most widely deployed Soviet ICBM, has been operational since 1966. It is a small, two-stage ICBM using storable-liquid propellants and an all-inertial guidance system. Only one version (Mod 1) of the SS-11 has been deployed to date, but testing

of a modified vehicle (Mod 2) began in July 1969 and is continuing.

86. The SS-11 Mod 1 has been test fired to a range of about 5,200 n.m. (NRE). In mid-1968 there were tests to ranges of 500-600 n.m., presumably to establish the capability of the missile for peripheral attack. The Mod 1 carries a RV which probably has a complex flared shape, and weighs about 1,500 pounds. The yield of the warhead is estimated to be [ ] Most estimates of SS-11 accuracy place the CEP at about 1 n.m.

87. The Mod 2 program is apparently being developed to enhance the penetration capability of the SS-11 against ABM defense of urban/industrial and soft military targets. There are significant gaps in our understanding of this program, however. The flight tests can be separated into two distinct groups called Type-A and Type-B. One, Type-A, probably represents development of exoatmospheric penetration aids,[17] and the other, Type-B, development of either endoatmospheric decoys or multiple warheads. [ ] All objects in both groups apparently are intended to have in-line patterns with no appreciable cross-range dispersion. The tankage remains near the train of objects [ ]

88. Certain aspects of the modification program are common to both the Type-A and Type-B firings. Both have a throw weight of about 2,000 pounds compared to the 1,500 pounds associated with the Mod 1 RV. Propellant has been added to the first stage of the SS-11 in both cases to compensate for the loss of range that would have resulted from the increased weight of the Mod 2 payloads, and indeed increases the operational range. No identifiable change has been made to the second stage. With the increased capability of the first stage, the SS-11 Mod 2 can deliver either the Type-A or Type-B payload to a range of about 6,000 n.m. (NRE).

89. As far as the Mod 2 payloads are concerned, most of the available data are related to the Type-A group of firings. Even here, however, the objects identified as probable penetration aids have not been clearly defined. They apparently function during the exoatmospheric or early re-entry phase of the flight. In the one test for which re-entry radar data are available, the re-entry trajectories of the probable penetration aids became significantly different from that of the RV below 100,000 feet, and they probably burned up prior to impact. [ ] Although the objects which appear to be penetration aids can be distinguished from the RV in the terminal phase—by sophisticated radars at above 100,000 feet—they do sufficiently resemble genuine RVs for a defense to be forced to take them seriously. Moreover, the ballistic coefficient of the Mod 2 Type-A RV [ ] results in an increased speed of travel through the atmosphere and places a requirement on an endoatmospheric defense system to react very

[17] For the purposes of this paper we define penetration aids to include only devices which may be included in the payload package of a missile system and dispensed prior to or during re-entry in order to confuse defensive systems, to prevent them from identifying any RVs carrying warheads, or to saturate defenses beyond their capacity.

quickly. The Type-A RV weight is comparable to or slightly heavier than the 1,500 pound RV of the Mod 1 SS-11.

90. Analysis of the Type-B group of firings is very preliminary. Two firings of this type also were recently conducted to extended range. [

] The ballistic coefficients of these three objects are higher than those of the Mod 1 RV and in the same class as that of the Mod 2 Type-A RV. However, it has not yet been determined if all three objects are RVs (i.e., carrying warheads), or whether one or more are decoys. It appears virtually certain, however, that the Type-B program is intended to aid in the penetration of endoatmospheric ABM defenses.

91. As indicated earlier, the higher ballistic coefficients of the Mod 2 re-entry vehicile(s) results in faster travel through the atmosphere, thereby reducing the reaction time available to an endoatmospheric defensive system. A bonus effect is the reduction of the re-entry contribution to system inaccuracy. [

] the SS-11 remains a soft target weapon, and extreme accuracy is evidently not a design goal.

92. The SS-11 Mod 2 has been tested 24 times since July 1969. Thirteen of the firings involved the Type-A payload, and 11 the Type-B. The 4 most recent tests, two of each type, were to the 4,400 n.m. (NRE) Pacific impact area. In the past, extended range firings in the Pacific have usually presaged the end of the R&D test firing program. Thus, the modified SS-11 could be ready for operational deployment late this year or early next year.

93. Three R&D tests, two Type-A and one Type-B, were to reduced ranges of about 550 n.m. These short-range firings are presumably tests of the capability of the Mod 2 to perform a peripheral attack role as well as to perform at full ICBM range. Since there are no ABM defenses present or contemplated in Europe, this suggests that the Soviets may be considering use of the Mod 2 in a dual role at the peripheral complexes, with a primary mission against Europe but with a secondary capability to hit targets in the US which may be defended by ABMs. On the other hand, they may merely have decided to test all the capabilities of the system at the outset and have no plans for early deployment of the Mod 2 at their peripheral complexes.

94. Indeed, it is uncertain how much if any Mod 2 deployment will take place. The Soviets would presumably wish to deploy it widely in the face of extensive US ABM defenses of populated areas, but might decide to hold off until they had a better idea of how much ABM deployment will actually take place in the US.

VI. THE SS-13

95. The SS-13, the most recent addition to the Soviet ICBM force, reached IOC in 1969 after a flight test program begun in late 1965. It is a three-stage solid-propellant ICBM somewhat larger than the US Minuteman. A probable prototype, designated Savage by the Western Intelligence Community, was paraded in Moscow in May 1965, several months before the flight test program began. Although the SS-13 is obviously a weapon system designed to attack only soft targets, less is known about its operational and technical characteristics than any other deployed Soviet ICBM.

96. [

]

These data indicate that the RV weighs about 1,000 pounds and is quite blunt, with a ballistic coefficient
This last value is lower than that of any other Soviet vehicle and again demonstrates the Soviet penchant for RVs with low ballistic coefficients. The yield of the warhead associated with this vehicle is estimated at

97. The guidance system appears to be a self-contained all-inertial system, but little else is known.

indicate that an estimated CEP of about 1.0 to 1.5 n.m. is probably representative of the true value.

98. To date the SS-13 has been tested to only 4,500 n.m. (NRE), a demonstrated capability sufficient to reach only the extreme northeastern portion of the US from the one complex where it is believed to be deployed.

could increase its range with the same payload to about 5,000 n.m. (NRE), sufficient to cover targets north of a line extending from southern Oregon to Raleigh, North Carolina.

the maximum range capability of the SS-13 is unknown. If

the range would be about 5,500 n.m.

99. The SS-13 program has been somewhat of an enigma. There is little doubt that the Soviets planned large-scale deployment of solid-propelled missiles. They began a massive expansion program for their solid-propellant industry in the early 1960s and are believed to be continuing to modernize those facilities. In late 1965 they began flight testing both the three-stage SS-13 and the two-stage SS-14 MRBM. The SS-14 program has progressed at a very slow pace, with no deployment detected more than five years after the first flight test.

100. It appears most likely that the SS-13 was in competition with the SS-11 in the early development phases and that it was the loser. This was probably because of problems the Soviets encountered in applying solid-propellant technology to large missiles. Flight testing of a modified SS-13 which began early in 1970 indicates, however, that the Soviets consider that continuation of the program will have some value as an investment in the application of solid-propellant technology to strategic missiles.

101. It appears that an operational variant of the SS-13 may be under development. Flight testing began early this year, with 8 firings completed through 6 October 1970. Six of the flight tests were from Plesetsk to the Kamchatka impact area The seventh and eighth were short-range firings of about 1,100 n.m., probably to an impact area near Norilsk.

indicate a new RV with a higher ballistic coefficient

[

] The limited data available also tenuously suggest possible modifications to the upper stages.

VII. OLDER ICBM SYSTEMS

The SS-7

102. The SS-7, the oldest system in the operational ICBM inventory, has been in service since late 1961. It is a two-stage tandem vehicle that uses storable-liquid propellants and employs an all-inertial guidance system. Several classes of RV weights have been tested over the years, and it is believed that two of these weight variants—carrying warheads [ ]—are currently deployed. The maximum operational ranges (NRE) of the two RV variants are 5,500 n.m. and 6,500 n.m., both of which are sufficient to reach targets throughout the US. The estimated accuracy of the system is not better than 1 n.m. (CEP) at ICBM ranges. This level of accuracy, given the estimated yields of its associated warheads, renders the SS-7 suitable for employment only against soft targets.

The SS-8

103. The SS-8, which reached operational status in 196[illegible], is a two-stage tandem vehicle with a radio-inertial guidance system. It uses non-storable liquid propellants, a characteristic which, combined with a poor flight test record, probably constituted the basis for the decision to limit its deployment. The SS-8 has been tested to ranges sufficient to cover targets throughout the US, carrying [ ] weapon. The estimated system CEP is about 1 n.m., limiting its employment to urban areas and other soft targets.

Refire Capability

104. We believe that the Soviets plan to refire from soft sites. We estimate that two missiles are available for each launcher, and that it would take two to four hours after the first launch to get off the second missile.

VIII. THE INTERCONTINENTAL BALLISTIC MISSILE RESEARCH AND DEVELOPMENT EFFORT—POTENTIAL NEW SYSTEMS

105. The past year has been one of considerable R&D activity at Soviet ICBM test ranges, involving some 45 ICBM R&D flight tests between 1 November 1969 and 31 October 1970. This compares with 13 during the preceding 12 months.

106. It is now evident that during the past few years the Soviets have been concentrating on testing variants of ICBM systems which are already deployed and operational, rather than on competitive new ICBM systems requiring deployment of completely new launch facilities. We have seen no more indications that the Soviets may be developing a large follow-on missile, or that a new small ICBM is planned. Nor is there any conclusive evidence of the development of mobile ICBMs, although the Soviet SALT representatives have opposed any provisions excluding mobile systems. The Soviets have developed mobile strategic systems of lesser range, one of which—the SS-14 MRBM—uses the upper two stages of the SS-13 ICBM. There has been no indication, however, of any attempt to develop a mobile version of the SS-13.

107. The one mobile missile program which has been suggested as having a potential ICBM application—the SS-X-15 program—appears to be in limbo or to have been cancelled. This two stage missile [ ] is probably the missile carried by the tracked transporter-erector-launcher displayed

in Moscow parades and designated the Scrooge system. The SS-X-15 has been flight tested eight times. The pace of these tests has been erratic, and no flights have been detected since 9 August 1969. The maximum operational range of this missile is still uncertain. If [ ] and the trajectory were optimized, the missile could achieve a range of 4,000-4,500 n.m. (NRE). The longest distance it has flown, however, is 3,100 n.m. These data do not provide a firm basis for judging the intent of the program. It is generally agreed that the small number of tests observed and the lack of any flights over the past year reduce the likelihood that the SS-X-15, as tested, will ever be deployed.

108. Much of the current R&D effort appears to be aimed at developing systems for penetrating US ABM defenses. This is a logical development. The only puzzling aspect is an apparent desire to have such systems ready for deployment by the end of this year, long before any US ABM could achieve IOC. One possible explanation is a desire to have the necessary hardware developed well in advance of any SALT agreement.

109. Two new RVs with significantly higher ballistic coefficients are being developed—an apparent reversal of the trend toward RVs with low betas. In the case of the SS-11 Mod 2, the change was apparently designed to shorten flight time in a terminal ABM environment and hence make the RV harder to intercept. The reason for developing the SS-13 Mod 2 RV, with its higher ballistic coefficient, is not yet apparent from available data. In both cases a result of the change is to decrease the degree to which variations in atmospheric conditions during the re-entry phase reduce accuracy. To achieve significantly higher accuracies, however, would require new, greatly improved guidance systems as well.

Future Systems

110. As noted above, there has been no activity which we can relate to a new ICBM (except the special case of the SS-X-15) over the past two years. In light of this, it is highly unlikely that the Soviets could bring any wholly new ICBM systems to operational status for at least the next 3-4 years. Based on our view of developments at the test ranges and of the probable Soviet view of their own needs, we believe that the USSR will concentrate in the near term on efforts to improve the quality of its present systems, in such areas as penetration aids, hardening of RVs, accuracy and MIRVs. In addition, however, they will probably continue at least exploratory research on land mobile ICBMs.

111. *Penetration Aids.* Present test activity designed to improve the capability of the SS-11 to penetrate ABM defenses will probably be completed late this year. Subsequent work may include efforts to develop more sophisticated penetration aids for the Soviet ICBM force. Since the Soviets probably understand the way the Safeguard system is intended to operate, they may seek to develop some form of endoatmospheric penetration aid system, possibly including terminal decoys; the SS-11 Mod 2 Type B (see paragraph 90) may be for this purpose.

112. *Hardening of RVs.* If they have not already done so, the Soviets will probably take steps to provide some degree of hardening of their RVs against the effects of nuclear radiation from ABM weapons.

113. *Accuracy.* [ ]

[ ] Some improvements in guidance accuracy and other qualitative factors will almost certainly take place, however, as a result of the normal advancement of the state-of-the-art, and reduction in G&G errors will also accrue from on-going programs. In earlier programs, the Soviets flew RVs having ballistic coefficients commensurate with high accuracy, and by now the packaging of suitable warheads in higher beta RVs should be within the Soviet state-of-the-art. In the final analysis, a decision to equip ICBMs with high accuracy guidance systems will depend on future Soviet targeting requirements and particularly on how much stress they wish to place on improving their capabilities against land-based US ICBMs.

114. *MIRVs.* The Soviets almost certainly have strong incentives, political as well as military, to develop MIRV capabilities comparable to those of the US. There have been various indications, some quite explicit, that they consider this to be an important area of strategic weaponry in which they need to catch up. For example, N. S. Kishilov, the secretary-general of the Soviet delegation to SALT, told a member of the US delegation that it was surely understandable why the USSR was not prepared to accept a ban on flight testing MIRVs; the US had completed its essential tests, while the USSR had not. In military terms the Soviets could envisage three possible missions for such weapons: to attack hard targets, to enhance their ability to penetrate ABM defense, and to provide greater assurance of retaining an assured retaliatory capacity in the face of a possible threat to their land-based missile force. Depending on their targeting doctrine, they might consider that a simple soft-target MIRV capability could serve their needs. If they wished to develop MIRVs for use against hard targets, they would require very high accuracy to attain a high kill probability, and thus a more sophisticated system and a longer development program. They might develop hard target MIRVs simply because it was technically feasible or because the US had done so.

115. As indicated earlier, it now appears that the Soviets may intend to use the mechanization system of the Mod 4 to develop a MIRV. The full extent of Soviet intentions with respect to MIRVs, however, is not yet evident. The possibilities are as follows:

a. A MIRV based on the Mod 4 mechanization could probably reach IOC by late 1971, but one reaching IOC this early would be no more accurate than the present SS-9, thereby limiting its effectiveness against hard targets.

b. To attain the high order of accuracy desired in a hard target MIRV, the Soviets would have to develop a vastly improved guidance system for the SS-9 launch vehicle, and new RVs. Development of such a new guidance system would require about two years of testing. Thus, if the Soviets are seeking to develop a Mod 4 MIRV with improved accuracy (say, with a CEP of 0.25 n.m.), it could not be available for deployment before late 1972 at the earliest.

c. The Soviets might seek a MIRV based on a different concept, such as that represented by the "bus" system used by the US, concurrently with an improvement in accuracy yielding a CEP of about 0.25 n.m. If so, they could accomplish *both* in about two years of testing or by the end of 1972 at the earliest.

116. *Mobile ICBMs.* The Soviets will probably continue work on land-mobile systems. In fact, they have indicated such an intent in current SALT negotiations. Land-mobile ICBMs would provide an alternative to the SLBM as a means of improving the surviv-

ability of retaliatory forces and they represent an area of weapon development in which the Soviets may feel they have an edge on the US. It still remains to be seen, however, whether they would wish to make extensive use of land-mobile systems. There are practical difficulties in deploying and maintaining the large and complicated pieces of equipment which would be required. Security considerations might serve to limit deployment in heavily populated areas. Deployment elsewhere might also be hindered by poor transportation facilities through much of the less populated part of the country and, in some areas, by permafrost.

Outlook for the Longer Term

117. We foresee no major shift from the patterns outlined above during the later 1970s. That is, we think that the Soviets, having built up a large force of ICBM launchers, will continue to concentrate on improvements in existing systems rather than on the development of entirely new ICBM systems requiring entirely new launch facilities. They will probably seek such qualitative improvements as improved capabilities for penetrating ABM defenses, larger numbers of RVs, and improvements in accuracy.

118. They probably believe that all three ICBM systems still being deployed have important growth potential. And even if they considered that development of essentially new missiles was desirable, they would have strong incentives to make them compatible with existing launch facilities, in view of the large numbers and the heavy investment involved.

119. Entirely new systems may appear, however. The survivability of their land-based ICBM force will probably be of increasing concern to the Soviets over the longer term. The principal effect might well be to stimulate interest in new SLBMs and land-mobile systems, since an effort to develop significantly harder silos and launch control centers would be very expensive. There are also more limited steps to increase survivability and force reliability which the Soviets could and probably would undertake, such as increasing the redundancy and hardness of their command and control systems.

IX. BALLISTIC MISSILE SUBMARINES

Y-Class

120. The mainstay of the Soviet ballistic missile fleet is the nuclear-powered Y-class submarines. Like US Polaris submarines, the Y-class has 16 launch tubes, but in most other respects it is different. The Y-class is larger—425 feet long with a 38 foot beam—and has a double rather than a single hull. Indeed, in terms of submerged displacement, the Y-class is the largest submarine in the world. It is [ ] probably capable of speeds of about 30 knots [ ] The Y-class can probably operate at a depth [ ] (1,300 feet). Its one major weakness is that while not as noisy as older classes of Soviet ballistic missile submarines, it is still not "quiet" by US standards.

121. The SS-N-6 missile carried on the Y-class uses a single-stage storable liquid-propellant system giving it a maximum range of about 1,300 n.m. With this missile, Y-class submarines positioned along the coastline of the US as much as 500 miles offshore could strike targets virtually anywhere in the country. The SS-N-6 is equipped with a single 1,500-pound class RV with a nuclear yield of [ ] and a CEP of about 0.4

n.m. Submarine navigational inaccuracies would probably result in a system CEP of about 0.7 n.m. even under favorable launch conditions, making the system primarily a soft target weapon. We believe that the Y-class submarine normally launches its missiles while moving submerged at speeds of about 3-5 knots. We estimate that the salvo time for the 16 missiles would be up to 4 to 5 minutes.

122. We estimate that Y-class submarines are being produced at the rate of 7-8 units per year and that production will soon average 8 per year. We believe that 14 are now operational and that five others are in various stages of fitting out and sea trials. Another 12 or 13 are believed to be in various stages of assembly, 8 at Severodvinsk in northwest USSR and 4 or 5 at Komsomol'sk in the Far East.

123. We estimate that Y-class production at Severodvinsk is 5 to 6 units per year, and at Komsomol'sk two units per year; the latter could increase to 2 to 3 units per year.

H-Class

124. Of the nine H-class nuclear-powered submarines built between 1958 and 1962, eight have been converted to carry three 700 n.m. SS-N-5 missiles, which are not only launched while the submarine is submerged but have more than double the range of the surface-launched SS-N-4 they replaced. The ninth unit, designated the H-III, has been extensively remodeled to provide it with six instead of its original three launch tubes and evidently began sea trials in June. It probably will be used as a platform for sea tests of the SS-NX-8 missile now under development.

Nuclear-Powered Ballistic Missile Submarine Force Levels

125. The following table shows the estimated number and status of Soviet *nuclear*-powered ballistic missile submarines as of 1 October 1970: (The number of missile launch tubes is in parenthesis.)

Class	Operational	Under construction	In outfitting or on sea trials	Total
H–II (3 Launchers)	8 (24)	0	0	8 (24)
H–III (6 Launchers) ...	...	...	...	1 (6)*
Y (16 Launchers)	14 (224)	12–13 (192–208)	5 (80)	31–32 (496–512)
	22 (248)	12–13 (192–208)	5 (80)	40–41 (526–542)*

* The exact status of the H-III is not known but we do not consider it to be operational at this time.

126. We estimate that some 31-32 Y-class submarines will be operational by the fall of 1972. If production continues at the estimated current rate—and we see no present indication of a slackening—the Y-class force will reach 40 units (comparable in size to the US Polaris fleet) in early 1974 and could have 50 units by mid-1975. How large the Y-class force grows will depend on a number of variable factors, including the SALT negotiations.

Patrol Activity

127. We estimate that 13 Y-class submarines are presently operational in the Northern Fleet. In early June 1969, some of these submarines began to conduct pa-

trols at regular intervals, lasting approximately 60 days. Since then Y-class submarines from the Northern Fleet have performed 21 patrols, 18 in the western Atlantic. (The other three were in connection with the large-scale Soviet naval exercise OKEAN in April-May 1970.) All Y-class patrols, with the possible exception of the first, have been conducted in areas between Bermuda and the Azores.

128. The Soviets have established their first patrol of a Y-class submarine in the Pacific. We expect the number and frequency of patrols will increase as the number of Y-class submarines assigned to the Pacific fleet grows.

129. In the meantime, patrol activity of the two H-II class submarines in the Far East has increased. Since September 1969, they have conducted four patrols in the eastern Pacific in the vicinity of the US coast. One of these came briefly within missile range of California, but the others stayed one to two days steaming time away. There have been five H-II patrols in the Atlantic in the past 12 months, none of which was detected within missile range of the US.

130. Prior to January 1970, Soviet ballistic missile submarines rarely patrolled within missile range of the US. Y-class units remained as much as one to two days sailing time away from potential launch points. This practice may be in the process of changing. So far this year, five and possibly eight of the 12 Y-class submarines which have patrolled in the Atlantic operated at some time during their patrols within missile range (1,300 n.m.) of US targets. In January, a Y-class patrolling southeast of Bermuda came within range for less than a week. In August, for the first time, two Y-class were simultaneously on patrol within range of the US—one for about two weeks, the other for 30 days. One of the two Y-class units on patrol in the Atlantic in November was detected within missile range of the US. The single patrol so far conducted in the Pacific has been within missile range.

131. It is not clear yet, because of the fluctuating pattern of patrols, what portion of their SSBN force the Soviets intend to maintain on station. They could decide, on the one hand, to place only a few on patrol, keeping the rest in home waters. In this case, essentially all deployable SSBNs—possibly 80 percent of the force—could be sent to sea in time of emergency or tension. It is more likely, however, that as additional Y-class units become operational, the Soviets will choose to deploy SSBNs routinely in greater numbers. But, because of the lack of forward bases and the operational limitations of the force, they probably could maintain no more than 30 percent of their SSBNs continuously on station within missile range of the US. This number could be increased to 50 percent in crisis periods, but probably for no longer than about 60 days.

132. The Soviets could keep more than 30 percent continuously on station if they had access to support facilities in areas nearer to the US than are the home ports from which they now operate. Having increased the tempo of their out-of-area operations in recent years, the Soviets undoubtedly see advantages in having such facilities. Recent evidence from U-2 photography and collateral sources suggests that the Soviets may be establishing such a support facility at Cienfuegos, Cuba. If Cienfuegos were to be used to support ballistic missile submarines, it would enable the Soviets to increase appreciably their time on station.

Roles and Missions of Ballistic Missile Submarines

133. We have no direct evidence as to the roles and missions of Soviet SSBNs. In the

past, it evidently was to strike industrial and population centers, presumably in part because the SSBN force was not large enough to support continuous patrols in substantial numbers within missile range of the US, which would have enabled them to attack strategic military targets on short notice. By building a sizeable fleet of Y-class submarines, however, the Soviets are developing the capability to handle both types of targets. The Y-class units which have come within missile range of the US this year were within range of a number of strategic installations, including SAC bomber bases and a Polaris base, which the Soviets probably would wish to target as a matter of urgency in a pre-emptive attack, but might also attack as part of a retaliatory strike.

G-Class Submarines [19]

134. The Soviet ballistic missile submarine fleet also includes 22 diesel-powered G-class units which were built between 1958 and 1962. Since 1965, 10 of these submarines are believed to have been converted to G-II units, each fitted with three 700 n.m. SS-N-5 missiles in place of the 300 n.m. SS-N-4s with which they were originally equipped. We believe that there is one unit now undergoing the same conversion which will probably be complete in 1971. G-class units have on occasion substituted for H-class submarines in a patrol area in the Pacific between Hawaii and the US. In the Atlantic, almost all the G-class deployments which we have detected have been in ocean areas almost equally distant from targets in the US and Europe and several days transit time away from possible launch areas against either.

135. We have long believed that once sufficient nuclear-powered submarines became available, the G-class would be used primarily against peripheral targets (including Hawaii and overseas US bases) and not against targets in the continental US. This is consistent with the line initially taken by the Soviets in SALT discussions. In a formal statement in June 1970, the Soviet chief delegate said that "We proceed from the fact that diesel submarines do not meet modern requirements and cannot pose a threat to the US." The point was that submarines such as the G-class did not need to be covered in an agreement. In a statement on 6 November 1970, however, he formally declared that all ballistic missile submarines should be taken into account under an agreement.

136. This shift in the Soviet position may be related to some change in the Soviet plans for those of the G-class submarines which we believe have not yet been converted to carry the SS-N-5 missile. There are several of these submarines which have not been operationally active for some time, suggesting that they may be undergoing some form of modification that is probably more extensive than that required for conversion to the SS-N-5. Meanwhile, we have detected the testing of a new naval missile (see the following section) having an estimated range of 3,000 n.m., whose estimated size makes it incompatible with the Y-class submarine. We think it unlikely that the Soviets would begin still another conversion program for the H-class submarines to equip them with a new missile and it is equally unlikely that they would begin a conversion program for the Y-class so soon after that class has become operational. The SS-NX-8 could fit into the G-class after certain modifications had been made to the submarine. We believe

[19] The role and status of the G-class diesel-powered, ballistic missile submarine will be further discussed in NIE 11-14-71, "Soviet Forces for Operations in Eurasia."

that if G-class submarines are being modified to carry the SS-NX-8, they will be fitted with six launch tubes as in the case of the H-III class.

137. To be sure, the G-class submarines are some 8-12 years old, but they still have several years of operational life left. The modification probably now under way could, if extensive enough, extend their useful life even longer. Although diesel-powered, they could, if equipped with a missile having a range of the SS-NX-8, be used to augment the threat to the US; with a missile of 3,000 n.m. range, they could stay on station for extended periods well outside the range of US detection systems and still be within missile range of many US targets. We think that 10 of the remaining unmodified G-class submarines—those in the Northern Fleet—will be converted to carry the SS-NX-8. The evidence is still insufficient, however, to establish this conclusively.

Future Systems

138. One new naval ballistic missile, the SS-NX-8, has been undergoing flight tests since June 1969. Eight flights have been detected, the last two in September and November 1970 respectively. Three of these tests were failures.

139. Our analysis indicates that the SS-NX-8 is a comparatively large missile, several feet longer and somewhat larger in diameter than the SS-N-6.

Flight tests indicate a range of about 3,000 n.m. Radar observations have detected only a single RV. There is no evidence of testing of penetration aids or depressed trajectories. The SS-NX-8 is apparently about the size of the Sawfly, a naval ballistic missile displayed since November 1967 in Moscow military parades, but there is no other present evidence indicating a relationship. The weight of the RV is not known. If the missile is in fact the size of the Sawfly, the RV could be in the 2,500-pound class.

140. A missile of the extended range of the SS-NX-8 could obviously add significantly to the flexibility and survivability of the Soviet SLBM force, but we have continuing uncertainties about the status and likely pace of the program. Testing of the missile has been carried forward at a slow pace, which could reflect a lack of urgency in the program. Although development could be completed some time in 1971 if the program were accelerated, the missile would probably not reach IOC before 1972 at the present pace. Meanwhile, the Soviets are continuing all-out production of the Y-class submarine, which lacks the depth of hull required to carry a missile as long as the SS-NX-8 appears to be and hence could probably not be readily converted to that system.

141. As indicated in paragraphs 124 and 137 above, we now believe that the SS-NX-8 will be flight tested from the six-tube H-III nuclear submarine and that 10 G-class diesel units not previously converted to carry the much shorter range SS-N-5 will be converted to carry six SS-NX-8 missiles each. This would provide an SS-NX-8 force of up to 66 missile launchers in the likely event that the H-III is retained in operational status after testing is complete. If the missile is ready in time, the first G-class submarine under conversion could reach operational status with the SS-NX-8 by about the end of 1971, and all 10 of the G-class units cited above could be operational with SS-NX-8 missiles by the end of 1976. We still lack conclusive evidence, however, that the Soviets are following this course.

142. There are even greater uncertainties about what other plans the Soviets may have for deploying the SS-NX-8. As indicated, the SS-NX-8 appears to be too long to be retrofitted into the Y-class submarine without major ship modifications which would degrade the speed and diving capability of the submarine. The eight H-class submarines other than the single six-tube H-III have just finished an extensive conversion to carry the SS-N-5, making another conversion to carry the SS-NX-8 questionable. It also appears questionable that the Soviets would undertake a second retrofit of the G-II diesel submarines to carry the SS-NX-8, especially since facilities to carry out such a program would probably not be available until the latter 1970s.

143. One possibility is that the Soviets would not deploy the SS-NX-8 except in the single H-III and 10 G-class units discussed above. If so, however, they would probably take other steps to provide themselves with extended range naval ballistic missiles. They might develop a new missile of extended range (say 2,000 n.m. or greater) which could be used in the present Y-class submarine with few or no ship modifications. The first retrofitted Y-class unit could probably not be operational before 1974.

144. Another possibility is that the Soviets do intend further deployment of the SS-NX-8 in a new class of sumarine designed to carry it, but that they have delayed construction of this new class in order to concentrate on building up the Y-class force as rapidly as possible. If the Soviets do in fact deploy a a new submarine for the SS-NX-8, the first units probably could not reach operational status until 1974-1975 at the earliest, considering the present commitment of production facilities to the Y-class and the long lead times involved.

X. HEAVY BOMBERS AND TANKERS

145. The Soviet heavy bomber force is made up of two types of aircraft—the TU-95 Bear and the M-type Bison, the only Soviet bombers believed to have a primary mission of intercontinental attack.[20] This force is located at five Long Range Aviation (LRA) bases.

TU-95 Bear

146. The four-engine turboprop Bear forms the largest element of the heavy bomber force. About 75 are equipped with a 350-mile range air-to-surface missile (ASM), the AS-3 Kangaroo. Another 30 are conventional bombers, and an additional five or six are used for reconnaissance and do not have a weapons delivery capability. Only about 50 of those armed with an ASM can be refueled in flight. Because of its greater range, the Bear has a better capability than the Bison for low-altitude attacks and for taking indirect routes to targets. In addition, the Bear ASM-carrier could launch its missile far from the target to avoid terminal defenses. Production of the strategic attack versions of the Bear has ended. Limited production of special variants has continued, but they have been for use of the Soviet Navy.

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[20] Although Soviet medium bomber forces have a limited capability for intercontinental attack, they are equipped and trained primarily for operations in Eurasia. NIE 11-14-71 will discuss their role in greater detail.

Maj. Gen. Rockly Triantafellu, the Assistant Chief of Staff, Intelligence, USAF, believes that continued Soviet Arctic training and new ASMs indicate that Soviet planners will retain the option to use a large number of the Badger/Blinder force under contingencies designed to maximize an all-out nuclear assault against North America. For example, in late October a reliable source reported seeing a probable new type ASM on a Badger flying over the Barents Sea. For these reasons, he believes that the Soviets intend to maintain the proficiency of their Badger/Blinder force for peripheral or intercontinental operations.

147. The *Air Force* believes that additional variants of the Bear could make their appearance in LRA during the period of this estimate. Although the most recent variants produced apparently have been assigned a naval role, the long-standing and continued interest in Bear modifications sugggests that the useful life of the strike versions (A, B, and C Models) could be extended with another variant. In view of Soviet interest in stand-off weapons and continuing ASM development, a new Bear with an improved ASM could become available by the mid-1970s.

M-Type Bison

148. The four-jet engine Bison serves either as a conventional bomber or as the aerial tanker for the heavy bomber force and the Bears assigned to the navy. Bison bombers are not equipped with an ASM. At present about 50 of the 85 Bisons are believed to be serving as tankers. Production of Bisons terminated in 1961.

Force Size

149. The equipment and composition of the heavy bomber force have been relatively unchanged in recent years. The following table summarizes the current strength of the heavy bomber force: (Figures are rounded to the nearest five).

	TU-95 Bear	M-type Bison
Missile-carriers	75	..
Free-fall Bombers	30	35
Aerial Tankers	..	50
Reconnaissance	5	..
Total	110	85

Operational Training

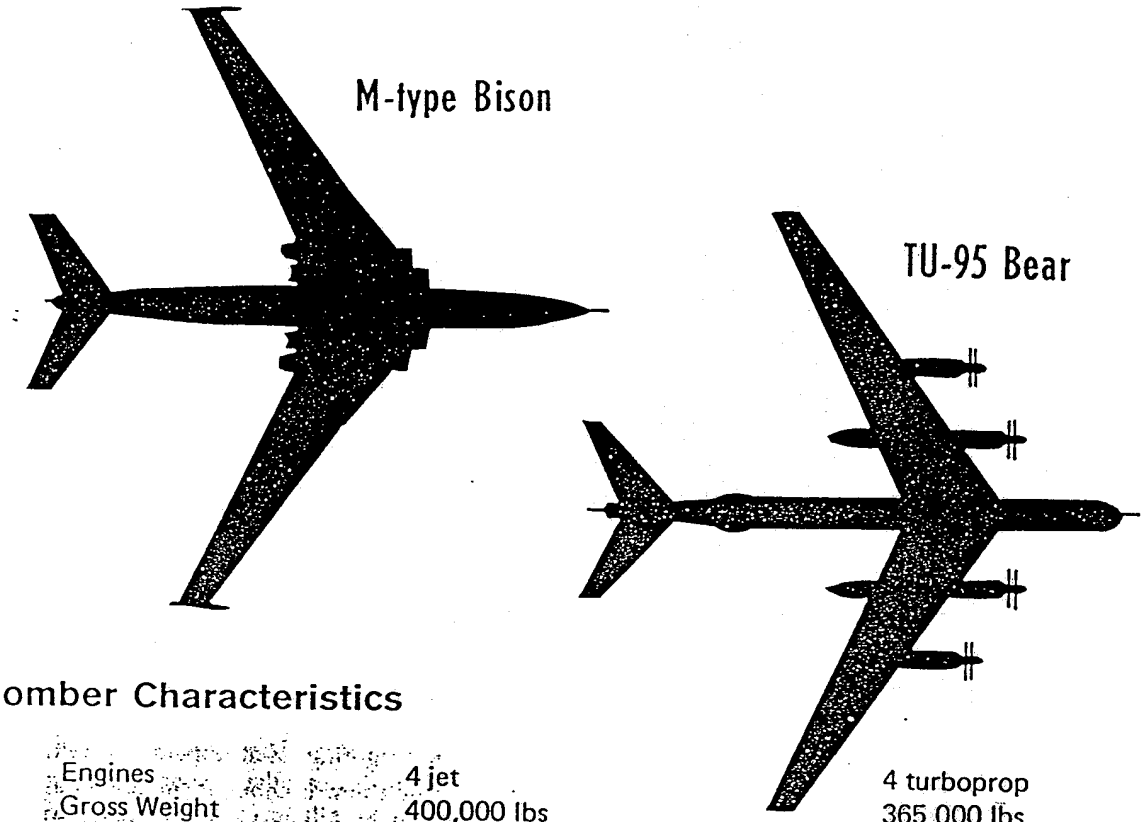
150. Overall training activity of the heavy bomber force continues to emphasize intercontinental missions and to sustain the trend of the past several years toward more realistic and complex exercises. Several flights over the sea approaches to Alaska in 1970 have come within 120 miles of the shore, but there have been no heavy bomber sorties off the eastern coasts of North America since May 1969.

151. Over the years Bear ASM-carriers have occasionally participated in naval exercises, suggesting that the Soviets intend to use the AS-3 missile against naval surface forces. Support of naval operations has, among other things, long been a secondary mission of Soviet LRA.

152. To our knowledge the Soviets have never employed heavy bombers as an airborne alert force, nor are there indications that bombers are maintained on the ground in a quick reaction posture comparable to the US SACs 15-minute alert.

New Bomber

153. In late July 1970, a qualified source reported sighting what appears to be the prototype of a new bomber at the Soviet airframe plant at Kazan. We have designated this aircraft the Kaz-A. We judge that the aircraft has probably now reached the flight test stage and could be ready for operational use in the 1974-1976 period. The aircraft was described as having a long slender fuselage and swept wings with a considerably smaller sweep angle for the outboard section than for the inboard section, suggesting that it is a variable-geometry wing type. The change in angle occurred at a point about halfway out on the wing. The inboard section appeared to have a sweep of no more than 45 degrees. The outer section had a sweep angle something less than 30 degrees. The aft part of the fuselage was wider than the forward part, suggesting that the engines were located there. The nose of the aircraft was quite pointed, much more than



Bomber Characteristics

Engines	4 jet	4 turboprop
Gross Weight	400,000 lbs	365,000 lbs
Combat Radius	3,050 nm	4,500 nm
Cruise Speed	445 kts	435 kts
Assumed Bomb Load	10,000 lbs	10,000 lbs

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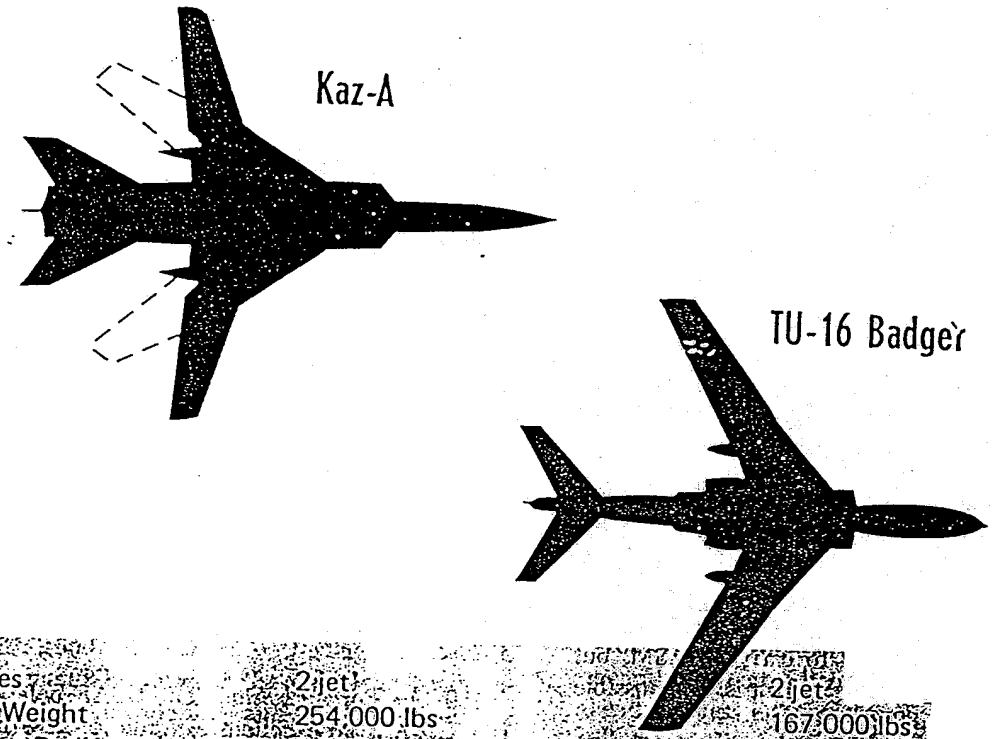
that of a Blinder parked nearby. The description of the aircraft and its comparison to the Blinder has enabled us to size it in general terms but many of the characteristics critical to an evaluation of an aircraft are missing. Hence, we do not have the same degree of confidence in our assessment of this aircraft that we have in the case of the Bison and Bear on which we have a considerable amount of photography, taken both while the aircraft were on the ground and while they were engaged in military fly-bys.

154. Our estimate of the performance capabilities of the Kaz-A is derived from an engineering design analysis of the observed configuration. The analysis utilizes such information on physical characteristics as is available. Where such information is not available, we have made estimates, based on our knowledge of the Soviet state-of-the-art, or, where necessary, what seem to be appropriate assumptions. We have assumed that the aircraft is fitted with engines like those used in the Soviet supersonic transport. We have esti-

Figure 5



	Kaz-A	TU-16 Badger
Engines	2 jet	2 jet
Gross Weight	254,000 lbs	167,000 lbs
Combat Radius	3,000 nm	1,650 nm
Cruise Speed	470 kts	445 kts
Assumed Bomb Load	6,600 lbs	6,600 lbs

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mated the size and locations of fuel cells based on standard engineering practices, taking into account the design characteristics of the aircraft, and on the assumption that the outer wing panels contain fuel cells. Characteristics such as gross weight and fuel consumption are estimated on a basis of Soviet technology and demonstrated trends in Soviet aircraft design. Using the estimated performance which we have then arrived at, we have postulated various mission profiles which the Kaz-A could fly.

155. To maximize range, the aircraft could cruise subsonically, with wings fully extended, at high altitudes all the way to the target. In this profile, with a 6,600-pound bomb load carried internally, it could achieve a combat radius of about 3,000 n.m. without inflight refueling. If, instead of bombs, it carried a 14,000-pound ASM partially buried in the fuselage, the aircraft could have a combat radius of about 2,900 n.m., not including the range of the ASM, under the same flight conditions. The high altitude profile is the

least desirable for an aircraft penetrating defended areas. If the aircraft with ASM made a low-level approach of 200 n.m. to the target at high subsonic speed, with wings swept back, the combat radius would be about 2,650 n.m. We believe that this type of mission profile is the one most likely intended for the Kaz-A, principally because it takes advantage of the aircraft's variable-geometry wing design and is the one which offers the highest probability of survival when penetrating defense systems. The Kaz-A would also be capable of speeds on the order of Mach 2 at high altitudes. Such speeds would be advantageous for penetrating areas defended by subsonic or transsonic fighters, but would provide only limited security over areas defended by SAMs or supersonic fighters.

156. Although we have no evidence of any ASM association with the Kaz-A, we would not expect to see such evidence at this early stage of the Kaz-A program. The plane probably will be equipped to carry an ASM, but a conventional bomber variant is also possible and could appear first.

157. The capabilities of the Kaz-A would appear to be greatly superior to those of the Badger and Blinder medium bombers for missions against Eurasian targets, particularly those deep in China, whose growing strategic importance for the Soviets could have been a strong stimulus to the development of the new bomber. Against the US on unrefueled two-way missions, the Kaz-A's capabilities appear to be marginal; from Arctic bases, the combat radius of the aircraft would take it over less than half of the US on a high altitude profile. Refueled, the aircraft could reach virtually all of the US on two-way missions from Arctic bases flying a high altitude profile. We estimate that the Kaz-A will be capable of aerial refueling but we have not identified a Soviet program to develop a new tanker to be used with the Kaz-A. It is not likely that the Soviets would rely on the aging Bison to support a new bomber force. There is at least one type of Soviet jet transport (the IL-62) that could be converted to this purpose by the time the Kaz-A could become operational.

158. *CIA, DIA, State, NSA, Army, and Navy Position:* We cannot be certain at this stage how the Soviets will employ the Kaz-A. It appears from the present evidence that the Kaz-A is best suited for peripheral operations but that it has capabilities for intercontinental attack. The Kaz-A would have range capabilities roughly comparable to the Bison (though not the Bear). The Kaz-A may have considerable growth potential, however. If the Soviets were to develop high efficiency turbofan engines, for example, its range could be increased by as much as 20 percent. Such improvements in performance are not likely to appear in deployed aircraft before the late 1970s.

159. *Air Force Position:* The USAF believes the Kaz-A is an excellent example of how improving technology can influence aircraft design to make it suitable for many missions. The Kaz-A's variable-geometry wing and modern engine make it suited for use in either peripheral or intercontinental operations. For peripheral operations, low altitude and supersonic penetrations can be achieved with the wing in the swept-back position. As a free-fall bomber, it is about 35 percent lighter than the Bison "heavy bomber" but has similar range/radius capabilities. For intercontinental missions, efficient cruise would be achieved with the wing in the full-forward position. As its performance is now assessed under various flight profiles (paragraph 155), the Kaz-A has the capability to reach many important CONUS target areas.

On balance, the USAF believes the Kaz-A possesses capabilities which make it suitable for peripheral and intercontinental operations and offers a range of attack options no Soviet planner would overlook. In view of its estimated growth potential (paragraph 158), variants of the Kaz-A could eventually satisfy the strategic mission requirements currently fulfilled by all the strategic bombers now in the LRA inventory.

XI. PROBLEMS OF ESTIMATING FUTURE SOVIET STRATEGIC ATTACK FORCES

Evidence in the Near and Long Term

160. We almost never have direct and reliable evidence on Soviet planning for the future of their forces for intercontinental attack. We have never had such evidence on quantitative goals. In its absence, we rely most heavily, for the near future, on an extrapolation of observed activity. This is possible because modern collection systems provide us with good information on testing and deployment and because of the long lead times involved in developing and deploying weapon systems. Decisions involving the next two years or so (and sometimes longer) have generally already been made, and activity is under way which we can detect and identify. For periods beyond this, there is progressively greater uncertainty, as the evidence becomes scantier and less reliable, and—very important—the knowable becomes the unknowable.

161. *The Next Two Years.* Soviet forces for intercontinental attack over the next two years or so can be determined with considerable confidence. We can be quite certain about the *kind* of weapon systems which will be deployed. It usually takes about two years from the time we observe the first flight test of a new ICBM until that system becomes operational in the field. This is the interval required to construct the deployed launch facilities and to carry out the flight test program.[21] Thus if a system is not now in R&D flight testing, it will probably not become operational until at least two years from now. The interval for SLBMs is about the same or longer, and for bombers it is much longer. In short, the weapons systems deployed over the next two years or so will be those already in operation or in the late stages of development. Major improvements to existing systems, however, could be carried out in less than two years.

162. We can also with some confidence estimate the *number* of weapons which will be operational in the short term. Construction of an SSBN is estimated to take about two years. We believe that construction of launch groups for the SS-9 takes about 18 months and that SS-11 groups normally require 12-18 months. It is also usually possible to establish reasonable production rates for bombers.

163. *In the Mid-Term.* Soviet forces for intercontinental attack in the period 2-5 years ahead are less easily determined, but we can still speak about them with some confidence. They will still be composed largely of existing delivery vehicles, deployed as at present. Nevertheless, some older delivery vehicles may have been phased out, additional vehicles for current systems may be brought into the force, and some new weapon systems presently being flight tested may be deployed. Toward the end of the period, some new weapon systems of which we have as yet no evidence may enter service.

164. We usually detect the initiation of the flight test program of a new ICBM system about two years prior to its IOC. When modifications to an existing missile system are involved, the warning time will vary depending

[21] A normal flight test program involves about 20 R&D launches [redacted]

upon the extent of modification, but in most cases we would expect the test program to take about as long as that for a new system. The development of a new submarine-launched ballistic missile takes 2-3 years after we first become aware of the program. For new bombers the period is up to 5 years. The lead time is longer than for an ICBM because of the complexity of modern bomber aircraft and the variety of integrated systems that must be thoroughly proven. Thus, while the introduction of a new bomber we have not seen is unlikely in the period 2-5 years in the future, introduction of new ICBM or SLBM systems is possible toward the end of the period. Neither a new ICBM nor a new SLBM, however, is likely to be deployed in substantial numbers by that time.

165. Our evidence on deployment and development activities provides a basis for assessing the *kinds* of weapons systems *available* to the Soviets for the period 2-5 years hence, but it provides little if any basis for estimating Soviet *intentions* concerning the size and mix of their future forces. Lead times continue to restrict the options open to Soviet planners in determining the composition of their forces, but they have considerably more latitude in determining their size and in setting priorities within them.

166. *In the Longer Term.* It is difficult to say anything very precise about Soviet forces for intercontinental attack beyond the next five years. For one thing, much about the subject matter is inherently *unknowable.* The Soviets have almost certainly not themselves made any firm decisions for even five years hence, much less for the year 1980. To the extent that present planning anticipates such decisions, information about it is virtually impossible to come by.

167. There is a further difficulty, at once obvious and subtle. Many Soviet decisions about the future are bound to be tentative at first, subject to revision as circumstances change. For example, what the Soviets do will be determined in large measure by what the US does and by what the Soviets estimate the US is likely to do in the future. As time goes on, however, the Soviet perception may turn out to have been wrong, or the US decision may change. US decisions in turn are affected by what the Soviets do or are expected to do, and are subject to the same uncertainties. Moreover, force development results from decisions worked out year by year on an incremental basis; the choices that appear appropriate this year may look different next year. It is impossible to estimate with confidence and precision the end result of this process of mutual adjustment over the next 5 to 10 years.

Indirect Approaches to Longer Term Estimates

168. Departing from "harder" evidence underlying near-term estimates, we can, for the long term, make some use of broader and more general considerations: premises and factors which will form the context within which Soviet decisions about alternative strategic force postures will be made. For example, we can ask: What effect will the basic aims and approach of the USSR in world politics have? Do relevant Soviet words and acts suggest that force decisions will be guided by some consciously articulated doctrinal rationale on strategic relationships? Do economic capabilities and constraints as we can foresee them indicate any very precise limits within which program choices will be made? What does our knowledge of the Soviet technological base and the likely scope and effectiveness of the R&D effort tell us? How will the play of internal politics in the Soviet system affect the decision-making process? While we do have some information on these

matters, it is often incomplete, unclear, or even contradictory; inference, deduction, even speculation inevitably play a large role. Nonetheless, this kind of indirect approach does help in thinking about the problem, and does serve to set at least rough bounds on what the Soviets might do. The balance of the present section discusses the above questions with a view to determining what light the possible answers may throw on future Soviet decisions affecting strategic attack forces.

Basic Aims of Soviet Policy

169. There is no question that Soviet policy remains committed to the spread of the Soviet system, is hostile to the US in particular, and proceeds from the premise that conflict in one form or another will determine relations between the superpowers for the indefinite future. Any notion that fundamental settlements are attainable which would make peaceful cooperation the dominant motif in Soviet-American relations is precluded by the USSR's continuing commitment to the ideological outlook which has governed its conduct since 1917. However frayed by history and its contradictions this ideology may seem, it appears still to provide the essential framework within which Soviet leaders see the issues of world politics, and in any case remains an indispensable prop of the regime internally.

170. All this being given, it might seem obvious to infer that the Soviet "intentions" implied in this outlook will lead the USSR invariably to seek maximum possible advantage over the US in strategic power. And it would follow that estimates of future Soviet programs should be guided by this consideration. But this is too simple. Even if one attributes such a goal to the Soviets, it provides no answer to questions about capability and resources to achieve it, or about how the Soviets would view the cost and risks of the attempt. And it is these issues which must still be studied if one wishes to arrive at an estimate of what the Soviets are up to and what weapons—with what characteristics, in what numbers, at what dates—the Soviets will have.

171. Moreover, it is not quite so self-evident as it might appear that the Soviets believe that their policies and intentions can be realized only by striving for the maximum possible advantage in strategic weaponry. They have, of course, shown by their effort over the last five years or so, that they are unwilling to remain in a position of marked inferiority, and that they consider their larger policy aims to be prejudiced by such a position. They have now largely closed the gap and have stated explicitly that they will not accept less than "equal security". But so far it is not clearly evident that they believe that their political goals in the world require a great deal more than that.

172. It is possible, though as yet also unproved, that the Soviets believe that "sufficiency"—something near the present strategic balance—will serve their purposes equally well. They could think this if they believed that the primary form of conflict with the US in the 1970s and beyond will be local politico-military confrontations in which superiority in conventional forces, characterized by mobility and long reach, will bring gains for Soviet policy. In this case, Soviet strategic forces large and sophisticated enough merely to "check" the opponent, and to take strategic forces out of the play, might be thought to be "enough".

173. In one way, this line of thought would be plausible for the Soviets to follow. They have always been keenly aware that power has varied ingredients and does not arise from large and imposing weaponry alone. Factors of will, skillful political operations, and of other forms of military strength also confer

power in their view. Nevertheless, the Soviets surely recognize that an evident advantage in modern strategic weapons can be one of the principal ingredients of power nowadays, especially in a psychological sense. We can be sure, therefore, that they will want at least equality in this field, and perhaps something more, depending on how they calculate the advantages and costs. But they could take this view regardless of their ideologically-inspired approach to power and conflict, simply because the USSR is a great state with global aspirations and a deep concern for its own and its allies' security.

174. In sum, an examination of the USSR's basic policy aims, including the ideology underlying them, does not carry one very far in estimating future programs for strategic weapons. The Soviets' stated aims and their preoccupation with power and conflict do establish that they aspire to supremacy over the US in power—broadly defined. The thrust of their strategic weapons programs in recent years suggests that they would like an advantage over the US in this aspect of power also. It is not established, however, that they believe this objective is feasible, or that they have no alternative to trying for it. Thus reasoning from the USSR's basic aims and ideology does not lead to confident long-term estimates of particular weapons developments and force posture.

Soviet Strategic Policy

175. *Doctrinal Writing.* If one descends one level from the broad policy aims discussed above to the strategic doctrines serving those aims, the paucity of information is what is most striking. The overt and secret materials which are available reveal no particular originality or imagination in exploring the strategic implications of missile-nuclear weapons. It would appear, largely from discussions in SALT, that there also exists a more refined and sophisticated body of strategic thinking. The strong interest shown by the Soviets in recent years in the systematic intellectual effort in the US to develop a modern strategic doctrine suggests that the Soviets are attempting to improve the standards of their own doctrine. But what is now known of Soviet strategic doctrine is of little or no help in estimating future Soviet strategic force programs.

176. *Implications of Current Soviet Programs.* One way of getting at Soviet force goals might be to discover from the evidence on development and deployment what kind of a strategic rationale underlies the design of current forces. This could have predictive value. Nothing very sophisticated or precise is meant by the term "strategic rationale". It refers to the rough categories and concepts commonly utilized in strategic analysis; parity, mutual deterrent, counterforce strategy, and the like. The effort can be made in two directions: by seeing if a strategic rationale can be deduced from the actual development and deployment of strategic forces, or by trying to establish whether the latter are consistent with a strategic rationale set forth on other grounds.

177. For this kind of analysis, the composition of Soviet forces can be more revealing than their size. For example, a case can be made that current Soviet deployment emphasizes weapons which serve the purposes of a strategy of deterrence rather than of counterforce. The argument is that of the strategic missiles now deployed against the US, only the SS-9 may have the combination of payload and accuracy to be suitable for use against hard targets. Similarily, most current development programs, such as those for the SS-NX-8 and the SS-11 Mod 2, are seen as efforts to improve survivability and the Soviet ability to penetrate US defenses, and thus to emphasize deterrence rather than a counterforce

capability. With respect to the eventual size of the entire force, there is some evidence that the program for deploying SS-11s at ICBM complexes may be drawing to a close, and some indications of a slowdown in SS-9 group starts. But these are tentative rather than definitive indications, and they permit no firm conclusions at this time.

178. An obvious difficulty with this method of analysis is that however much it may yield correct answers for the present, it does not necessarily do so for the future. There are other problems. The concepts and categories mentioned above, such as parity, are not capable of precise definition. To the extent that this is so, their predictive value is reduced. Similarly, even if the Soviets were to opt, say, for strategic parity, it is unlikely that evidence from deployment would conclusively demonstrate the fact. The Soviet view of the size and mix of weapons that constituted parity would probably differ from the US view. Moreover, the true Soviet intent could be obscured by asymmetries in forces arising from differences in geography, history, tradition, and the like.

179. Even if one could establish a likely strategic rationale, there is no simple relationship between it and an estimate of future Soviet forces. The conceptual and definitional problems discussed in the previous paragraph would apply. Moreover, many force decisions, when measured against the strategic concept, are bound to be irrational and essentially unpredictable. Sheer inertia may produce Soviet programs lacking any reasonable relationship to a strategic concept; budgetary consideration or bureaucratic infighting can do the same.

180. Such problems notwithstanding, it remains true that Soviet intercontinental systems are deployed to meet, at least roughly, some Soviet concept of nuclear strategy. Thus, it remains highly useful analytically to try and ascertain what that strategy might be through an examination of deployment patterns or otherwise. The predictive value of the approach, however, is limited by the considerations discussed above; it does not permit any very precise forecast of the size and composition of Soviet forces in the future.

181. *Implications of SALT.* At Helsinki and Vienna the Soviets for the first time engaged in a serious discussion of strategic issues. They made a number of statements concerning the USSR's policy toward its strategic forces, its view of the Soviet-US strategic relationship, and its strategic aims. These statements have largely omitted the propaganda and bombast that frequently characterize Soviet public statements on these subjects. They have been couched in much the same terminology used in the US; thus, apparently at least, the US and Soviet negotiators are using the same wave length in a series of fairly frank exchanges on strategic questions. We cannot, of course, be certain that the views expressed by the Soviet negotiators reflect in every instance the true position of their government.

182. Soviet spokesmen have repeatedly stated that the USSR's basic aim in SALT is to maintain a condition of "equal security" for themselves in relation to the US. They have indicated a certain sympathy with the argument that an increase in armaments does not necessarily increase security and may even lessen it for both sides. They recognize that differences in geography, doctrine, commitments and the like have led to asymmetries between US and Soviet forces, but if there is an agreement, such asymmetries, they say, must not be allowed to give either side a strategic advantage.

183. Since the Soviets say that they see the present relationship as one of rough parity and are seeking "equal security" at SALT, it is possible that the broad criterion which governs Soviet strategic programs, and would do

so even in the absence of an arms control agreement, is in fact something like rough parity. Though, for reasons discussed above, they would doubtless like to have a margin of advantage in some form, they may appreciate that any great enough to be of political or military significance would be likely to provoke a US response, and thus be self-defeating. If so, they would have assumed large additional economic costs and strains without in the end having registered a relative gain in strategic power.

184. For the present, however, the implications of the exchanges in SALT are inconclusive as to Soviet strategic policy and objectives. It remains possible that the Soviet approach is exploratory or designed merely to slow the pace of the strategic arms race. The most that can be drawn from SALT so far is some encouragement that the Soviets may be willing to accept a stabilized strategic relationship based on "equal security" for both sides. Whether or not this is what their policy aims at will become more clear only as they spell out their concrete positions in future rounds of SALT.

185. *China as a Factor in Soviet Strategic Policy.* The massive deployment of theater forces to the Sino-Soviet border area over the last several years is a measure of Soviet concern with the Chinese threat. This concern, however, has thus far had little or no discernible effect upon Soviet strategic forces. It is likely that plans for future deployments of Soviet strategic forces will be affected by the potential Chinese threat.

186. In a war with China, the Soviets would undoubtedly attack China's strategic nuclear forces. Soviet targeting doctrine, however, appears to call also for attacks on administrative centers and urban/industrial areas. These exist in large numbers; thus it seems likely that forces designed for intercontinental attack would be used to supplement peripheral forces in a strategic attack on China.

187. Over the next five years, the Chinese can probably deploy IRBMs equipped with warheads in the megaton range, and possibly a few ICBMs as well. The threat from such weapons will surely become of increasing concern to the Soviets. If they feel that they must have forces specifically designated to counter such a threat, they could deploy additional forces suitable for peripheral attack, such as MRBMs and IRBMs, and they could augment their strategic defenses. It is also possible, however, that they would bring intercontinental weapons into play. If so, rather than deploy additional weapons for the purpose, they could give some of their existing intercontinental weapons a dual mission—against China and against targets in the US and Europe. Alternatively, they could put intercontinental weapons into place which they would not have deployed in the absence of the Chinese threat. Thus, the question of how the Soviets respond to a Chinese development introduces additional uncertainties concerning strategic policy and, of course the size and disposition of Soviet strategic attack forces in the 1970s and beyond.

Economic Capabilities and Constraints

188. We cannot place any precise limit on what the Soviets could spend on their forces for intercontinental attack—if they were prepared to make the requisite sacrifices in other areas. For the most part, physical capacity does not constitute a constraint; the existing plant capacity of Soviet industry appears to be adequate to support a substantial expansion in defense output. Important exceptions to this generalization are the submarine shipyards and nuclear materials facilities; at present these are working at about capacity, though their enlargement would not be an immense burden.

189. This is not to say that economic considerations do not provide a guide, if only a

rough one, to the defense burden which the Soviets could or would be willing to assume. We have detailed estimates of defense spending in various categories for the last 20 years which reveal how rapidly the Soviets have expanded priority weapons programs and total defense spending. Past growth rates provide useful yardsticks for putting bounds on the likely pace and magnitude of future weapons programs. We believe it unlikely, for example, that the Soviets would be able to accelerate spending for intercontinental attack much beyond the rate of growth of the past five years without affecting other programs.

190. The desire to avoid a new round of increasing military expenditures, particularly those which might be required to counter the US deployment of new and more advanced systems, is thought to be one of the principal elements influencing the Soviets to enter into SALT. Also, the increasing technical complexity of the military forces, together with the growth of military R&D and space programs, has produced a rapid increase in requirements for highly trained technicians and managers and the most advanced equipment and materials. The military's first claim on these scarce resources has contributed to the difficulties that the Soviets have experienced in introducing new technology into the civilian economy and, to some extent, to the resulting decline in the productivity of new investment.

191. The perennial problem of resource allocation is likely to remain a major issue in deliberations on Soviet national policy in the next few years. Given the great size of the economy, however, even relatively low growth rates would increase available resources considerably. Although increases in military spending might slow future growth and modernization, it seems unlikely that the USSR would, for purely economic reasons, be obliged to forego any military programs its leaders saw as essential. Thus an analysis of the present Soviet economic situation does not provide any very precise guide to what will be possible or not possible in the intercontinental attack forces.

The Dynamism of Research and Development

192. In the present era, the rapidity of technological advance tends to produce especially vigorous action and reaction between the military programs of the USSR and the US, and it has made the strategic relationship more susceptible to change than ever before. Moreover, every important new strategic weapons system or significant improvement to an existing system is extremely complicated, extremely expensive, and requires a long lead time from its inception to its eventual operational deployment. The technological contest between the USSR and the US is one of invention, development, testing, deployment, and intelligence, and above all one of anticipation: each side must provide not so much against what its adversary has at the moment, but against what it will have or what it *may* have 5 to 10 years ahead. Technological rivalry takes on a life of its own; there is inescapable pressure to give high priority to a vigorous development effort.

193. We estimate that Soviet expenditures for military R&D have now surpassed those of the US, and we expect this growth to continue into the 1970s. This scale of expenditures does not mean that the Soviets are at the same level as the US in technology but it does mean that they are well aware of the importance of qualitative improvements in their forces, are willing to devote a larger share of their resources to the development of new technology than is the US, and are pushing hard to close the technological gap between the US and the USSR if they can.

194. The main result of this R&D effort will be to increase the technical options open to the Soviets in the future, which will in turn enable them better to anticipate or to react to developments in US forces. The Soviets are certainly aware that, although they have "caught up" in intercontinental attack delivery vehicles, their forces do not have the flexibility and capability of the US forces. Over the next decade they will seek ways not only to counter US forces, but also to develop new capabilities of their own.

195. But while the range of options open to the Soviet planners will undoubtedly increase, it is unlikely that all the technical possibilities opened up by R&D will be exploited. Some lines of investigation may be pursued as a hedge against possible US developments, but not carried through to operational deployment. Moreover, as strategic weapon systems become ever more complicated and costly, the Soviets will be forced to choose from among the more promising, a necessity that will be reinforced by the demands of the economy and other military claimants. Thus, at the present stage, momentum and interaction in R&D efforts greatly increase uncertainty in estimates of deployed intercontinental attack forces, especially over a longer period.

Internal Politics and Military Decision-Making

196. Soviet military policy is in part a product of Kremlin politics which, like politics everywhere, involves questions of power and priorities. Today, the Soviet Union operates under a collective leadership. We have ample evidence that nothing of consequence is decided until it has been collectively scrutinized and weighed against the individual views and interests of the principal political leaders. While this method often produces decisions which represent only the least common denominator, it also gives some scope to the interplay of conflicting bureaucratic interests, including the military interest. The military influence on decisions is bound to be great, partly because the resources given to defense are large and because decisions affecting defense are so complex. In these circumstances, the claims of national defense and the voice of the Soviet military establishment can be expected to have considerable weight in the deliberations of the leadership. The situation of the military has changed since it suffered public abuse from Khrushchev, and was driven into frightened silence by Stalin.

197. The influence of the military is probably exercised in ways not entirely different from those in any other state with a substantial military establishment. Although no professional military man sits on the Politburo, the Soviet military clearly exert pressures and urge reasons for continuing arms programs and undertaking new ones, together with the scientific and industrial groups which support them. As elsewhere, the military are not always of one mind. There is ample evidence of disagreement on questions of great significance to military policy, e.g., the relative emphasis to be placed on strategic and conventional forces. Such disagreements enhance the control of the political leadership, which has a broader range of concerns, especially economic, than the military. The new conscription law introduced in 1967, for example, better serves civilian economic interests than it does professional military needs.

198. In the main, however, political and military leaders seem to share the same basic outlook on world affairs, and on Soviet defense needs. The party leadership's accommodation of the military in the costly programs of recent years appears to have been largely willing. There is no visible basis for anticipating critical differences between them on future issues of defense policy. In any event, political controls over the military, which run from top to bottom of the military

establishment, are evidently as effective as they have ever been; although the military may occasionally chafe at these controls, they do not seriously question them and would not be in a position to challenge them.

199. While we know something, therefore, about the process of reaching decisions on military policy, we know little or nothing about the actual interplay of political forces within the Politburo, i.e., what interests are represented by whom, and how powerful these interests are. Thus, an analysis of political dynamics in the Soviet Union is not sufficient to contribute directly to the task of estimating future forces as a whole, let alone the particular segment discussed in this paper. It can only be said that military policy is made as the result of a political process involving debate, hard bargaining, and bureaucratic infighting, in which the military interest plays a substantial role.

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200. The various indirect approaches to longer term estimates discussed above are suggestive and useful. Each by itself contributes something to such estimates; taken together, they contribute more. They illuminate the context and the broad limits within which choices will be made and some of the factors which will bear on those choices. They also furnish some insight into the kinds of choices that the Soviets might think reasonable for their intercontinental forces, and help to rule out others.

201. For purposes of the next section, which deals with possible future Soviet forces, the methods discussed have serious shortcomings. Although they help to establish what is reasonable and not reasonable, they do not point clearly to a force of a particular size and composition. They do not help to reach estimates as to when the Soviets may have a hard-target MIRV, or whether they will emphasize survivability of their forces by developing mobile ICBMs or building more seaborne systems, and so on. The approach utilized in the next section takes account of these deficiencies, as well as of the lack of direct evidence which prompted recourse to indirect approaches in the first place.

XII. FUTURE FORCES [22]

202. Having gained not only a credible deterrent, but also recognition as substantially equal to the US in overall strategic power, the Soviets are now confronted with the possi-

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[22] 1. Maj. Gen. Rockly Triantafellu, the Assistant Chief of Staff, Intelligence, USAF, dissents to Part XII and its Appendix. Specific reasons for his dissent include:

a. He notes that many illustrations in Part XII and judgments elsewhere in the document appear to involve some game analysis of assumed war scenarios. He believes the assumptions and methodologies underlying such analysis have not been sufficiently explained; the document does not reveal the statistical and analytical disciplines that normally characterize gaming of contemporary nuclear forces and which are required to generalize about scenarios, targeting and kill capabilities. This is particularly true regarding assessments of Soviet targeting doctrine. He believes these assessments tend to rely too heavily on the judgment that Soviet forces would be built almost exclusively for the purpose of neutralizing land-based strategic forces without regard to sea-based strategic forces.

b. In his view, the Force Models have several features which tend to make them imbalanced illustrative forces.

(1) He notes that all B Force Models are considered under a heading: "maintenance of parity without arms control." But he believes some quantitative and qualitative weapons mixes within the B Force Models could represent "parity" or "superiority" depending upon a number of variables which are not taken into account. For example, the B Force Models do not clearly illustrate the impact on strategic offensive forces that warning systems, ABM defenses and ASW capabilities would have in the total US-USSR power balance. These are essential considerations not fully discussed in this document.

Footnote continued at top of next page.

(2) The Force Models are constructed so as to imply that given one part of the Soviet "triad" of ICBMs, SLBMs, and bombers, the other two parts must also be associated with it as illustrated. Although the Force Models are described as illustrative, he feels that they imply limits on Soviet force planning options which, in his view, probably do not exist. He would note, for example, that six ICBM models are associated with but four SLBM and three bomber models.

c. He agrees that the illustrative forces in Part XII and the Appendix are not estimates, as is pointed out in Conclusions Y and Z and in paragraphs 241 and 267. In his view, this failure to provide an *estimate* (encompassing the normal 75 percent probability range) will hamper any force planner in assessing future Soviet forces and will lead to misinterpretations of this document.

2. In his view, in the absence of a strategic arms limitation agreement, Soviet force goals in 1975 and beyond are more likely to fall within the following ranges:

a. ICBMs: A force of some 1,600-1,800 ICBM launchers is likely to consist mainly of a mix of hard-target capable SS-9s with 3-6 MIRVs and soft-target SS-11s with improved accuracies, penaids, and possibly MIRVs. The addition of mobile ICBMs is anticipated. Improvements in CEPs are expected; the lowest CEP they are likely to seek at intercontinental ranges would be on the order of .25 n.m. Even assuming tests began soon, he considers it unlikely that the Soviets could have significant numbers of such missiles in the operational ICBM force by 1975.

b. SLBMs: A force of some 45-55 nuclear powered Y-Class submarines equipped with the SS-N-6 missiles and up to 10 diesel powered modified G-Class submarines equipped with the SS-NX-8 missile is considered likely. A new submarine equipped with the SS-NX-8 missile will probably be introduced into the operational inventory by 1975. In his view, missile accuracies could be improved, but an operational system accuracy better than .4 n.m. is unlikely.

c. STRATEGIC BOMBERS: Since these recallable and reusable systems provide Soviet planners with wide flexible options in response to conventional and nuclear war contingencies, the current strategic bomber fleet will most likely be upgraded with the addition of the Kaz-A and a compatible tanker in 1974-1975; new variants of the Bear and improved ASMs are also expected to enter service. In his view, the Bear/Bison force will remain at about present levels through 1975. Estimating a Kaz-A production rate of 25-50 beginning in 1974-1975, between 100-200 of these strategic aircraft could also be operational by 1978.

bility of falling behind the US in the latter part of the 1970s as a result of improvements in US strategic forces. Many courses of action are theoretically open to them, but they can be usefully categorized under several headings. They could allow their relative position to deteriorate somewhat and still maintain a credible deterrent. They could maintain a position of rough parity with the US, either through an arms control agreement or by making appropriate changes in their forces in the absence of an agreement. Or they could attempt to improve their position by trying to outrun the US in an arms race. Within each of these general approaches, a large number of alternative force packages would meet in varying degrees the aims of Soviet policy. The balance of the paper considers the shape that future Soviet forces for intercontinental attack might take.

A Strategic Arms Limitation Agreement

203. The Soviets, in the context of SALT, seem to be having a hard look at the option of seeking a stabilized strategic relationship. An agreement would hold out to the Soviets the possibility of preserving a position of rough equality without incurring a new round of expenditures on strategic armaments—in a period in which demands on Soviet resources in other areas, military as well as civilian, will probably be heavy. It is possible, moreover, that the Soviets would see advantage in pursuing the power competition inherent in the Soviet-American relationship on the basis of a stabilized strategic situation such as might emerge from SALT.

204. We recognize that the strategic arms limitations talks could have several possible outcomes, with varying effects on Soviet forces. Nonetheless, it seems reasonable to assume, considering the course of the negotiations thus far, that an agreement would have something like the following general fea-

tures. There would be a limitation on intercontinental delivery vehicles in the neighborhood of 2,000 (with freedom to mix subject to agreed limitations) and with a sublimit on large missiles. ABMs would be limited to the defense of the national capitals, or possibly banned entirely. There would be little restraint, if any, on R&D or on qualitative improvements to the force.

205. Because the Soviets under arms control would still be seeking at least to keep pace with the US, the composition of their forces for intercontinental attack and the magnitude of their effort in this field would depend heavily on US actions. The US forces which the Soviets could anticipate for 1975 under the agreement would undoubtedly appear to be formidable and require some action on their part. The Soviets would face the prospect of a progressive buildup of Minuteman III and Poseidon, both equipped with accurate MIRVs, which they would probably regard as eventually posing a counterforce threat to the fixed Soviet ICBM force. They would certainly seek to counter improvements to US forces that threaten the Soviet deterrent.

206. In this situation, we believe that the Soviets would give major emphasis to maintaining and improving their retaliatory capabilities, and the survivability of their force. Some of their new weapons systems would certainly have improved counterforce capabilities as well. We would expect to see the vigorous Soviet R&D effort continue, and there would be strong incentives to increase it. Despite its cost, a large R&D effort might be a relatively inexpensive means of keeping pace with the US. It would provide a number of options from which the Soviets could select to counter particular developments on the US side; moreover, the Soviets might consider that possession of these options would have a restraining influence on US actions. Furthermore, it would provide a hedge against the possibility that the agreement would be abrogated.

207. An arms control agreement of the type assumed would probably lead to new directions in Soviet R&D. The limitation on ABM defenses would reduce the need for penetration aids and MRVs, to which the Soviets have devoted much development effort in recent years. The incentive to develop MIRVs, however, would remain great; the Soviets would wish to do so if only to keep pace with the US and to preserve or improve their retaliatory capability. Soft target MIRVs would answer the latter purpose, but hard target MIRVs would probably be developed as well, if only in the normal course of product improvement. The desire to improve the survivability of their forces might lead to development of a mobile ICBM, if such a development is permitted under an agreement, and possibly to a greater R&D emphasis on seaborne systems.

208. How far the Soviets would go in actually deploying the products of their ongoing R&D programs is problematical. So long as they believed that the strategic balance was in fact remaining stable—especially if either explicit or tacit arrangements emerged to curtail US MIRV deployment—their incentives to press ahead with expensive new deployment programs would be reduced. On the other hand, there would almost certainly continue to be strong pressures to have new or improved systems brought into the inventory as they became available. If the Soviets came to believe that the US was pressing its opportunities to upgrade its forces—most notably through improving its counterforce capabilities—the Soviets could have strong incentives to respond with MIRVs on a large portion of the SS-9 force. Other likely responses would be to develop soft-target MIRVs for

the widely deployed SS-11 (and perhaps other missiles) to improve the retaliatory capabilities of those weapons surviving an initial US attack, or to exercise what options were permitted for shifting to more survivable SLBMs or land-mobile ICBM forces.

209. Considerations that might lead the Soviets to improve their intercontinental bomber force include the availability of improved aircraft, service interests, the capabilities of aircraft for varying the attack, and the desire to complicate (and make more costly) the US problem of defense. Under the assumed agreement, however, it seems more likely that the Soviets would decide to concentrate on less vulnerable ballistic missiles against which the US could provide no extensive defense rather than to replace their aging heavy bombers with new aircraft.

210. Despite the possibilities mentioned above, there are many uncertainties affecting the composition and development of Soviet forces under a SALT agreement. An intense competitiveness, channeled by the agreement into the area of R&D and qualitative improvement, might be the principal determinant of Soviet force decisions. It is also possible, though perhaps less likely, that the agreement itself might change the climate of Soviet-American relations in such a way that, for the short term at least, competition for gains within the agreement would seem less pressing. Thus, many variations affecting particular decisions for Soviet forces under SALT are conceivable, especially with respect to the timing of certain developments.

Possible Forces in the Absence of an Agreement

211. For the reasons discussed in Section XI, our evidence provides little basis for a confident estimate of the size and composition of Soviet forces beyond the next few years. Accordingly, we present here not one but several examples of possible Soviet forces in the absence of an arms control agreement. The first two discussed are limiting cases; they represent an attempt to establish the lower and upper limits within which the Soviet forces are likely to fall. The other forces fall between these two limits.

212. Broadly speaking, the forces reflect differences in:

a. Soviet objectives relative to the Soviet preception of the US threat;

b. The pace of Soviet technological developments;

c. The resources which the Soviets are willing to apply.

We discuss the condition under which the Soviets might adopt each force and what they might achieve vis-à-vis the US by deploying it.

213. The subsections which immediately follow attempt to lay the groundwork for this effort. They cover in order:

a. The Soviet perception of the US threat;

b. Possible developments with respect to MIRVs and improvements in accuracy;

c. Possible developments in the deployment of particular weapons systems.

The last two subsections present and discuss the alternative forces.

Soviet Perception of the Threat

214. Soviet force planners are well informed about current US strategic forces and possible changes in them over the next few years, on the basis of the open literature, testimony

before congressional committees, and extensive public discussion of strategic weapons procurement. There is ample evidence that Soviet analysts and officials follow developments in the US closely and are well aware both of the programs up for consideration and of the public debate about them. They surely know from past experience that not all proposed weapons programs are adopted, and probably think in terms of a range of possible US strategic force postures. In the process, it is likely that the Soviets make generous assumptions about US capabilities, partially to be on the safe side, partially because of their view of the US as dominated by a "military-industrial complex."

215. We do not know, of course, exactly how the Soviets would project the threat likely to be posed by the US strategic forces during the 1970s. It is probable, however, that they would begin with present forces and presently programmed additions and improvements. To this they would add some further major additions and improvements talked about in the technical press. The range of possible major changes in US strategic forces might look like the following to the Soviets:

MAJOR CHANGES INCLUDED IN PROGRAMMED FORCE	MAJOR CHANGES INCLUDED IN AUGMENTED FORCE I	MAJOR CHANGES INCLUDED IN AUGMENTED FORCE II
Some reduction in B-52s.	Retain all B-52s.	Retain all B-52s.
Minuteman III retrofitted to about half the Minuteman force.	Minuteman III retrofitted to the entire Minuteman force.	Minuteman III retrofitted to the entire Minuteman force.
Poseidon retrofitted [ ]	Poseidon retrofitted [ ]	Poseidon retrofitted [ ]
Safeguard Phase II, providing light area defense of the entire country as well as defense of Minuteman complexes.	Additional Safeguard deployment.	Still more Safeguard deployment.
		B-1
		ULMS

[ ]

216. As the Soviets might view the postulated US forces, they would have four features in common:

a. They would provide large numbers of accurate MIRVs, which would give the US the capability, within five years, to launch thousands of warheads against the Soviet Union. Regardless of what the US might say publicly about their intended use, the MIRVs would have, or would probably be assumed to have, yields and accuracies of an order sufficient to threaten a significant part of the Soviet force. Soviet planners would be aware that they do not now have, and are not likely soon to have, an ABM defense against these missiles.

b. They would include sizeable numbers of ABMs, requiring multiple Soviet RVs or penetration aids to overcome them.

c. Two-thirds or more of the missile RVs would be deployed on submarines which would be relatively invulnerable to attack.

d. Although some effects of the introduction of new US systems would be felt in the early 1970s, the full impact would not occur until the late 1970s, especially in the case of forces augmented beyond the currently programmed forces.

217. We do not know what estimate the Soviets might make of the probability that the US would deploy one or another of the postulated forces. Although the Soviets certainly recognize that some presently projected programs might be delayed or curtailed, they would almost certainly feel compelled to take account of at least the programmed US forces in their own force planning. They might consider it prudent to assume a level of effort something like US Augmented Force I, and they might look upon something like Augmented Force II as a "worst case" possibility.

Multiple Re-entry Vehicles and Accuracy

218. In the face of potential developments in US forces, the Soviet planners will certainly insist upon maintaining a high level of R&D so as to increase the options open to them. Some of these options we can now discern with varying degrees of confidence; others we can only postulate on the basis of Soviet requirements as we see them, and their general level of weapons technology. Perhaps the major R&D problem for the Soviets over the next decade is that of RV development for their ICBMs and SLBMs, and related developments which determine the number, characteristics, and potential capabilities of RVs against US targets. This central problem may best be analyzed in terms of alternative developments in related technologies: for MIRVs and for accuracy.

Multiple Re-entry Vehicles

219. Considering that they have a technical capability and an incentive (see paragraphs 114-115), we continue to estimate that the Soviets will develop and deploy hard target MIRVs capable of attacking Minuteman. The timing of this development is open to question. The Soviets could by the end of 1971 have a MIRV utilizing the guidance system employed on the SS-9 and with about the same accuracy as the SS-9. By the end of 1972 they could have a MIRV with a CEP of about .25 n.m. Given our understanding of the technology involved, we see no reason why MIRVs should be delayed more than three years beyond the dates cited above. Thus, MIRVs with a CEP of about .25 n.m. would be available by the end of 1975 at the latest. This judgment is based upon our appreciation of the Soviet "state-of-the-art."

220. We assume that the Soviets will develop MIRVs initially for the SS-9, using the three-RV Mod 4 mechanization (as now appears to be the case) or a different system such as that represented by the "bus" concept used by the US, or both. A new system could have as few as three RVs, as with the Mod 4 mechanization, but six RVs, each with about the yield of an SS-11 Mod 1, would probably fit well on the SS-9. Moreover, it should be no more difficult technologically to develop six RVs than three. In making our projections we have postulated either three MIRVs or six MIRVs on systems entering the force as early as 1973 and six MIRVs on systems entering the force in 1976 or later. For projection purposes we have assumed that a 3-RV system with the accuracy of the present SS-9 Mod 1 and Mod 2 and using the Mod 4 mechanization could be available for deployment in late 1971 at the earliest. A MIRV system using a more sophisticated concept and with accuracy of say .25 n.m. CEP could be available one year later. This system would carry three or six RVs.

221. Soviet technology could probably develop rapidly enough to permit the deployment by 1975 of 12 MIRVs on the SS-9 and 3 MIRVs on the SS-11 and on SLBMs.

Although our information is fragmentary, we believe that the Soviets could have developed such weapons and with warhead weights like those which would be used on the MIRVs mentioned above. In any case, we have postulated that such warheads could be available in 1975, and that they would be used then or later on a three-MIRV SS-11 and a three-MIRV SLBM. We have not included a 12-MIRV SS-9 in the force projections, in part because it does not improve hard target kill capabilities. We cannot exclude the possibility, however, that they will develop a 12-MIRV system, simply because they can do so, or because of the advantages that it would offer in assured destruction and targeting flexibility.

Improvements in Accuracy

222. We can generally ascertain the number of RVs being tested on a Soviet missile, and whether they are individually targeted. We are confident that we would detect and identify efforts to increase accuracy, although we have no such certainty about determining the precise accuracy achieved. A flight test program incorporating both significant improvements in guidance techniques or components and a new RV or RVs with higher ballistic coefficients would constitute convincing evidence that development of a system with markedly improved accuracy was under way. Sufficient accuracy would give each RV a high probability of rendering inoperable a Minuteman silo or other hard target.

223. Considering the warheads available to them and the type of hard targets they might wish to attack, a CEP of about .25 n.m. represents, in our view, the kind of accuracy the Soviets would require to achieve a hard target capability with MIRVs. We believe that they could achieve a CEP of about .25 n.m. with their present guidance modes. This would be achieved by improvements in guidance components, e.g., accelerometers and gyroscopes, resulting either from a specific effort or, in time, from the normal product improvement activity carried on by Soviet research laboratories. New RVs with ballistic coefficients of at least 1,000 pounds per square foot would also be required. Significantly greater accuracy would, of course, be advantageous but, in our judgment, would require going well beyond the current state-of-the-art in guidance concepts, e.g., to stellar or terminal guidance, and we think it unlikely that the Soviets will do this during the 1970s. The above judgments are based on our understanding of the Soviet state-of-the-art as derived from fragmentary information and from an appreciation of the relationship of Soviet technology to that of the US.

224. A test program to achieve an accuracy of about .25 n.m. would require about two years, and we have seen no evidence of one. Based on our understanding of the Soviet state-of-the-art, it could begin as early as this year, with deployment commencing in late 1972. As in the case of MIRV technology, we have no reason to think its start would be delayed beyond 1973, with deployment beginning in late 1975 or 1976. We have projected this improved accuracy on all new Soviet *fixed* ICBM systems or variants with an IOC of 1976 or later, and in the case of some forces as early as 1973.

Weapons Systems

225. Future Soviet forces will be affected not only by the very important potential developments in MIRVs and in missile accuracy discussed above, but also by decisions regard-

ing the deployment of this or that system and the phasing out of older systems. This section sets forth the estimates and assumptions with respect to various weapons systems that we have used in constructing the alternate forces. The principal assumptions used in projecting the illustrative forces are derived from judgments of capability expressed earlier in the estimate and are summarized below. Where necessary, additional assumptions are explained in the descriptions of specific forces.

ICBMs

226. *SS-9.* We estimated earlier that about 80 percent of the SS-9 silos now operational are for Mod 2s and that the remainder are Mod 1s except for [ ] groups of Mod 3s. We have somewhat arbitrarily limited deployment of the Mod 3 to three groups in all of the projected forces. In all but the lower limiting force, it is assumed that all other SS-9s that will become operational before MIRVs are available will be Mod 2s. Deployment of the Mod 4 as an MRV is depicted only in the lower limiting force, on the assumption that a MIRV is not deployed as a direct outcome of the new phase of Mod 4 testing. We assume that, on the basis of past performance, the Soviets could sustain future deployment of the SS-9 at a rate of up to nine group starts per year.

227. *SS-11.* We assume that all presently operational SS-11s are equipped with the Mod 1, but that both versions of the SS-11 Mod 2 that the Soviets are now testing on the SS-11 could begin entering the force by the end of 1970. We have included the SS-11 Mod 2 in all of the projected forces, although we do not attempt to decide what the mix will be between the Type A and the Type B. There is no apparent technical constraint on the development of a modified SS-11 with an accuracy of about .25 n.m. [ ] We have included these systems in those forces which place heavy emphasis on gaining substantial counterforce capability.

228. *Peripheral SS-11.* For purposes of the projections, it is assumed that the SS-11 launchers located at MRBM and IRBM sites are assigned a primary mission of peripheral attack.[23] These launchers therefore are not included in these projections. To the extent that they are available for use against the US, they should be considered additive to the several illustrative forces.

229. *SS-13 Variants.* As noted earlier (paragraphs 32 and 33) the SS-13 weapon system may be more survivable than other Soviet ICBMs, and therefore a good second strike weapon. In the absence of more evidence on the SS-13 Mod 2, however, and in the light of the extensive deployment of the SS-11, we have assumed that this advantage alone would not induce the Soviets to increase the slow pace of SS-13 deployment or the proportion of SS-13s in the force. We do not foresee the Soviets attempting to give the SS-13 a capability against hard targets.

230. *SS-7 and SS-8.* In all cases, we have assumed that considerations of age, high operating costs, and relative vulnerability would lead the Soviets to phase out the soft SS-7s and all SS-8s by 1975 and the hard SS-7s by the late 1970s.

231. *Mobile Systems.* We have assumed that a land-mobile ICBM would not reach IOC until 1975 at the earliest, and would

[23] Mr. Leonard Weiss, for the Director of Intelligence and Research, Department of State, does not agree with this assumption. Col. John D. Foulk, for the Assistant Chief of Staff for Intelligence, Department of the Army; Capt. William N. Hatch, for the Assistant Chief of Naval Operations (Intelligence), Department of the Navy; and Maj. Gen. Rockly Triantafellu, the Assistant Chief of Staff, Intelligence, USAF, also do not agree with this assumption.

have payload capabilities equivalent to those of the SS-13. We have projected deployment of mobile ICBMs only in forces where high survivability is an overriding requirement and in the upper limiting force.

Ballistic Missile Submarines

232. *SSBNs.* We project continued Soviet production of nuclear-powered ballistic missile submarines at the rate of about 8 per year until they have achieved a force of 40-60.

233. *SS-NX-8.* We assume that this missile will be operational by late 1971 and that 10 G-I class submarines will be modified to carry it (6 tubes per submarine). We here designate the platform the G-III. We have not projected a retrofit of the G-II, which has already undergone one conversion. While one H-class submarine has already been modified, apparently to carry the SS-NX-8, the other eight of these submarines have only recently been through one modification program and there is doubt that they would undergo another so soon. Accordingly, we have not included deployment of the SS-NX-8 missiles in the H-II class submarines in the projected forces.

234. In order to take account of probable Soviet interest in having a widely deployed follow-on missile of greater range than the SS-N-6 now carried on the Y-class submarine, we have postulated two possible ways of meeting such a requirement:

—One alternative assumes that the Soviets develop an entirely new missile with a range of 2,000 n.m. or more, compatible with the widely deployed Y-class submarine. It assumes that a single RV version of such a missile could be available as early as 1974 and a 3-RV MIRV version could be available by 1975, if given sufficient priority, and in any event by 1978. For projection purposes we have postulated deployment of this new missile in all but the lower limiting force.

—Another alternative assumes that the Soviets deploy the SS-NX-8 in a new submarine reaching IOC in the 1974-1975 period. For projection purposes we have deployed the SS-NX-8 in this fashion only in the upper limiting force, using a 3-RV MIRVed version.

235. We have postulated 3-MIRV systems on SLBMs in most of the illustrative forces. In three forces we have introduced them in 1975 on the SS-NX-8 with no improvements in current system accuracy. In the upper limiting force these reach IOC as early as 1974 on the SS-NX-8 with improved system accuracy. In all four of these forces we have postulated a new missile for the Y-class submarine with 3 MIRVs and improved accuracy in 1978.

236. *H-II Class Submarines.* For most of the illustrative forces we have assumed that the H-II class submarines are transferred from the intercontinental attack forces to the peripheral attack forces as the number of Y-class submarines reach about 40.

Bombers

237. We have postulated that the Kaz-A would begin to enter operational units in 1975. A reasonable annual production program would provide about 25 aircraft in 1975, 30 aircraft in 1976, and 35 in 1977 and subsequent years, yielding a force of 125 in 1978. An all-out program might provide 50 aircraft per year beginning in 1975, resulting in a force of 200 in 1978.

238. It was concluded earlier that the Kaz-A is best suited for peripheral operations, but that it has capabilities for intercontinental attack. It was noted that the Kaz-A may have considerable growth potential. In the present

state of our knowledge, and in the absence of a suitable tanker, it is uncertain whether the Soviets intend to use the Kaz-A as an intercontinental bomber. An arbitrary decision has been made to include the aircraft in the Tables with this reservation in mind, in part because of the possibility that a version with improved range may appear in the late 1970s.

239. We have postulated rates of attrition for older Soviet aircraft ranging from a reduction of the force to about half its present level by mid-1975 to maintenance of the entire force until the Kaz-A is deployed in some numbers. Since the capabilities of the Kaz-A most closely approach that of the Bison among the present heavy bombers, we assume that it would replace the bomber version of Bison and that the latter would be retired.

Alternative Force Developments [24]

240. A great variety of intercontinental attack forces can reasonably be postulated for the Soviets in the 1970s. We think that some limits can be set in terms of technological development, deployment capability, and availability of resources. These are by no means hard and fast, however, and even within such limits there are many options. Moreover, as we have seen, a number of other factors greatly influence Soviet strategic policy, such as the Soviet perception of the threat, other military requirements, and internal political and bureaucratic considerations. And finally, force development is an empirical process worked out year by year on an incremental basis; the choices that appear to Soviet planners to be appropriate this year may look different next year, and will almost certainly be modified or changed many times before the mid- to late-1970s.

241. The alternative force developments presented in this section represent possible directions that Soviet strategic policy could take in the absence of an arms control agreement. As will be seen, we consider some of them more likely than others. It should be emphasized, however, that we consider no one of them an estimate that Soviet intercontinental attack forces will be composed of the particular weapon systems in the precise numbers listed. They are intended to be illustrative of possible trends and differing emphases, and as such are not suitable for military planning purposes. For Defense planning purposes the reader should consult the forthcoming Defense Intelligence Projections for Planning (DIPP-71).

242. The alternative forces differ in the relative emphasis given to retaliatory vs. counterforce capabilities. This emphasis is a function both of Soviet intentions and Soviet capabilities. In some cases, for example, we have assumed that the Soviets will choose not to press ahead with R&D as fast as possible; in others, that achievement of technical goals is delayed despite their efforts; and in others, that technological advances occur at the earliest possible date. The forces with the earliest counterforce capabilities are those which reflect the most rapid pace of technological change.

243. The alternative forces necessarily have certain common features. Regardless of specific Soviet objectives, continued technological advance seems inevitable. All of the forces, too, are keyed in one way or another to the US strategic threat. And while there are differences in the perception of the threat and in responses to that threat, all the forces maintain as a basic element a strong deterrent posture.

244. In the projections which follow, we have postulated two limiting cases. Force A,

[24] Alternative illustrative force models are discussed in the following pages. A table summarizing and comparing the force models as of mid-1975 is found on page 77.

Minimum Posture, projects no more than the completion of existing ICBM construction, the start of about 10 more Y-class submarines, and some qualitative improvements. Force D, *Maximum Posture*, reflects a buildup of intercontinental attack forces across the board at the highest rates consistent with past performance and expected technical capabilities.

245. Between these limiting cases we have projected models of courses of action which the Soviets might deem desirable, and have explained the nature of the forces and the conditions under which we think the Soviets might adopt them. It is worth repeating that many other models could be postulated, and in any one model representing a particular strategic approach and level of technical advance, many other force levels could be projected in general or in detail. But we think the models chosen are representative of possible courses of action. We have selected for presentation three possible courses of action without arms control—Forces B-1, B-2, and B-3—which assume a Soviet strategic goal of maintaining rough parity with US forces; the alternatives represent different levels of technical advance. All of these models would preserve or improve the survivability of the Soviet forces and incorporate penetration aids against US ABM defenses. They would have some counterforce capabilities, depending on the level of technology. We have also selected for presentation an Alternative C, which represents a conscious Soviet effort to gain significant counterforce capabilities against US ICBM forces; it does not, however, go as far in this direction as the limiting Force D, which involves greater SLBM and bomber forces, larger strategic defense forces, and high levels of technical advance after 1975.

246. In the following discussion of alternative forces, summary tables show the status of those forces as of mid-1975. The year 1975 represents the end of the near-term period of five years for which, as noted in Section XI above, we are able to project with some confidence. In modeling these forces, however, we have further extended the projections to 1978 and have briefly summarized these extended projections and their rationales in the text.[25] The principal reason for so doing is that the size and capabilities of present US and Soviet strategic forces and the length of time required to develop and deploy new weapons systems are such that neither side can effect any significant change in the strategic balance over the next four or five years.

247. The potential for change in the US-USSR strategic relationship after 1975, however, increases rapidly and this is reflected in the illustrative forces. In most cases, the major qualitative improvements that are projected—accurate MIRVs, Kaz-A, follow-on SLBMs—do not enter service until the mid-1970s and are not available in significant numbers until the late-1970s. Moreover, the extended period permits a further numerical buildup, and in some cases there is a considerable increase in the number of deliverable weapons after 1975.

Illustrative Force Model A: *Minimum Posture*

248. Force A is illustrative of a decision on the part of the Soviet leaders to go with what they have plus the minimum necessary to maintain a credible deterrent against US programmed forces. Our analysis indicates that Force A would provide the Soviets with a strong retaliatory capability against programmed US forces throughout the decade. But after 1975, if the US were to deploy some other proposed forces (more extensive ABM, complete changeover to Minuteman III, for

[25] The Appendix to Section XII contains tables giving numbers of delivery vehicles in each illustrative force for the years 1970-1978.

instance), Soviet forces would have to be augmented much more rapidly than in Force A in order to maintain a strong retaliatory capability.

ILLUSTRATIVE FORCE MODEL A
(MID-1975)

	Delivery Vehicles	Independently Targeted RVs
ICBMs	1,302	1,302
SS-7	66	66
SS-9	306	306
Mod 1	(48)	(48)
Mod 2	(192)	(192)
Mod 3	(18)	(18)
Mod 4 (MRV)	(48)	(48)
SS-11	850	850
Mod 1	(340)	(340)
Mod 2	(510)	(510)
SS-13 Mod 2	80	80
SLBMs	712	712
G-III/SS-NX-8	7/42	42
H-II/SS-N-5	8/24	24
H-III/SS-NX-8	1/6	6
Y/SS-N-6	40/640	640
BOMBERS	80	
Bear ASM	65	
Bear Bomber	5	
Bison Bomber	10	
Bison Tanker	(35)	
TOTAL	2,094	2,014

249. As the table indicates, Force A involves only modest technical advance, deactivation of most of the old ICBM launchers, and a halt in ICBM deployment after current construction is completed. Projected force improvements would have the purpose of maintaining retaliatory capabilities in the face of planned US MIRV and ABM programs. Survivability would be enhanced by the continuing deployment of Y-class SSBNs to a force of some 40 units in 1974 and by deployment of some mobile ICBMs starting in 1976. Penetration capabilities would be improved by equipping the SS-9s still under construction with MRVs and by replacing the SS-11 Mod 1 with the Mod 2. Retrofit of the SS-9 with a 6-MIRV payload with an accuracy of about .25 n.m. beginning in 1977 would improve counterforce as well as retaliatory capabilities.

250. Force A was deliberately designed to set forth a rough lower limit to a range within which Soviet forces might fall. Its conscious adoption would involve voluntary Soviet acceptance of some deterioration of their present strategic capabilities relative to US programmed forces. Nevertheless, the Soviets might conceivably follow this course if they were convinced that US forces were not going to develop at a pace more rapid than programmed forces, and if they felt the need to cut back substantially their expenditures on forces for intercontinental attack. Implementation of Force A would result in savings on the order of about a billion rubles a year (about $1.5 billion) compared with spending levels for intercontinental attack forces in the late 1960s, or about 40 percent.

Illustrative Force Model D: *Maximum Posture*

251. Force D roughly illustrates what we believe would be a maximum Soviet effort, short of converting to a wartime basis. It represents the simultaneous deployment of systems at the highest sustained rate ever achieved by each in the past. It would cost about twice as much per year as recent levels of expenditures for the intercontinental attack forces. It assumes parallel developments in strategic defense programs that would also cost substantially more than the current high levels of expenditures for strategic defenses. We consider that this illustrative force represents the highest resource allocation the Soviets would make in peacetime.

ILLUSTRATIVE FORCE MODEL D
(MID-1975)

	Delivery Vehicles	Independently Targeted RVs
ICBMs	1,971	3,921
SS-7	66	66
SS-9	480	2,430
Mod 2	(72)	(72)
Mod 3	(18)	(18)
6 MIRV	(390)	(2,340)
SS-11	1,200	1,200
Mod 1	(600)	(600)
Mod 2	(600)	(600)
SS-13 Mod 2	200	200
Mobile	25	25
SLBMs	768	1,136
G-III/SS-NX-8	7/42*	78
H-III (3 MIRV)	1/6	18
Y/SS-N-6	35/560	560
New SSBN/SS-NX-8 (3 MIRV)	10/160	480
BOMBERS	190	
Bear ASM	75	
Bear Bomber	30	
Bison Bomber	35	
Bison Tanker	(50)	
KAZ-A	50	
TOTAL	2,929	5,057

* Some have three MIRVs.

252. Like Force A, Force D is in a sense an artificial one, in that it was deliberately designed to represent the limit of a range. It is a rough upper limit, because we are not able to place a precise quantitative limit on any of the factors which constrain major weapons deployment levels. It represents a most formidable undertaking in terms of size, pace, and number of major weapons programs. We believe, therefore, that this illustrative force, while not infeasible, would require a considerable reordering of economic priorities both within the defense establishment and in the civilian economy. It also represents our view of maximum technical progress; in fact, we doubt that the rate and extent of progress postulated would be reached unless the Soviets were making an all-out effort.

253. Force D would provide the USSR with a high retaliatory capability through the 1970's against either US programmed forces, or the postulated US augmented forces. Moreover, in 1976 the accurate weapons in the Soviet ICBM force would be theoretically capable of destroying some 90 percent of US land-based missiles in a counterforce pre-emptive strike. The MIRVs in the submarine force would enable the Soviets to target a large number of soft US military installations. In an exchange with the US, the Soviets could still expect to receive extremely high levels of damage, even after a pre-emptive strike.

254. Counterforce capabilities would be improved primarily by deployment of a hard target [26] 6-MIRV payload on the SS-9 beginning late in 1972 and ending in 1976.

Retaliatory capabilities would be improved by the buildup of SS-11s and SS-13s, by deployment of the SS-11 Mod 2, by adding a new submarine as well as by continuing Y-class construction, and by introducing in 1975 a mobile ICBM. The old ICBM launchers would be deactivated by 1977. Bomber strength would be increased over current levels by deployment of the Kaz-A starting in 1975.

255. The Soviets might undertake such a build up if the US were to begin a massive build up of its own strategic forces in a clear effort to upset the present balance. They might

[26] Except where the context indicates otherwise, the term "hard target" refers to a RV with a CEP of about .25 n.m. This is a rough and ready designation; the hard target capability of a warhead depends on its yield and on the hardness of the target, as well as on accuracy.

also do so in an effort to achieve some measure of recognizable superiority over the US. They would probably see both political and military utility in achievement of such a posture, although they would also see considerable economic disadvantage. Moreover, they would be unlikely to embark on such a course unless they judged that the US would not react in such a way as to offset the Soviet effort.

Illustrative Force Model B: *Maintenance of Parity without Arms Control*

256. Forces B-1, B-2, and B-3 illustrate three alternative ways the Soviets might react if they assumed that the US force in the 1970s would be on the order of the Programmed Force or Augmented Force I. The capabilities provided by the B forces would retain for the Soviets a position of rough strategic parity. Annual outlays would be about the same as those on intercontinental attack forces during the latter 1960s; Forces B-1 and B-2 would cost somewhat less and B-3 somewhat more. Our analysis indicates that a force like the B forces would enable the Soviets to maintain strong retaliatory capabilities throughout the decade, even against Augmented Force II. Counter-force capabilities would be improved by the deployment of accurate MIRVs.

257. The three B forces vary primarily with respect to the time that MIRVs are introduced:

Force B-1. Begins retrofit of the SS-9 with a hard-target 3-MIRV payload in 1973 followed with a hard-target 6-MIRV payload in 1978. Begins to introduce a 3-MIRV payload on an SLBM in 1975. Of the B forces, B-1 provides the earliest hard-target MIRV capability.

Force B-2. Begins deployment of the SS-9 with a soft-target 3-MIRV payload having a CEP about the same as the present SS-9 in 1972, followed by a hard-target 6-MIRV payload in 1976. Forces B-1 and B-2 postulate the same SLBM MIRV package and have the same number of delivery vehicles.

Force B-3. Deploys no MIRVs in the 1972-1975 period; a hard-target 6-MIRV payload is introduced only on the SS-9, in 1976. Force B-3 compensates for this slow MIRV development primarily by deploying additional ICBMs and 10 more SSBNs; as a consequence, it gives the USSR a more favorable strategic posture vis-à-vis the US in the late-1970s than either Force B-1 or B-2.

ILLUSTRATIVE FORCE MODELS B-1, B-2, AND B-3
(MID-1975)

	B-1 [a] Delivery Vehicles	Independently Targeted RVs	B-2 [a] Delivery Vehicles	Independently Targeted RVs	B-3 Delivery Vehicles	Independently Targeted RVs
ICBMs	1,384	1,364	1,384	1,936	1,713	1,713
SS-7	66	66	66	66	66	66
SS-9	318	798	318	870	402	402
Mod 1	.....	.....	.....	.....	(48)	(48)
Mod 2	(60)	(60)	(24)	(24)	(336)	(336)
Mod 3	(18)	(18)	(18)	(18)	(18)	(18)
3 MIRV [b]	(240)	(720)	(276)	(828)	.....	.....
SS-11	900	900	900	900	1,100	1,100
Mod 1	(440)	(440)	(440)	(440)	(600)	(600)
Mod 2	(460)	(460)	(460)	(460)	(500)	(500)
SS-13 Mod 2	100	100	100	100	120	120
Mobile	.....	.....	.....	.....	25	25
SLBMs	848	872	848	872	920	920
G-III/SS-NX-8	7/42 [c]	66	7/42 [c]	66	7/42	42
H-II/SS-N-5	.....	.....	.....	.....	8/24	24
H-III/SS-NX-8	1/6	6	1/6	6	1/6	6
Y/SS-N-6	34/544	544	34/544	544	37/592	592
Y/New Missile	16/256	256	16/256	256	16/256	256
BOMBERS	130		130		130	
Bear ASM	75		75		75	
Bear Bomber	20		20		20	
Bison Bomber	10		10		10	
Bison Tanker	(50)		(50)		(50)	
KAZ-A	25		25		25	
TOTAL	2,362	2,736	2,362	2,808	2,763	2,633

[a] See paragraph 258 for another possible postulation.
[b] This MIRV has a CEP of 0.25 n.m. in Force B-1 and 0.6 n.m. in Force B-2.
[c] Some have three MIRVs.

258. The three illustrative B forces are structured on the assumption that the Soviets, under the conditions postulated, would concentrate on qualitative improvements, and continue to deploy ICBMs only if the appearance of MIRVs were delayed. As noted earlier, these and the other forces discussed in this section represent possible trends and different emphasis, and none is an estimate that Soviet intercontinental attack forces will be composed of the particular weapons systems in the precise numbers listed. In the case of the B variants, it is useful to point out another possibility—that the Soviets would wish to undertake some further deployment of ICBMs even if a MIRV became available as early as 1972

or 1973. If such were the case, we would postulate an additional two years deployment of the SS-9 in both Forces B-1 and B-2, and would show about 80 more SS-9s than now appear in the tables.

259. In all three B forces there is an effort to enhance counterforce capabilities but the major emphasis is given to improvement of retaliatory capabilities. This is apparent in the large-scale program to replace the SS-11 Mod 1s with SS-11 Mod 2s, in the large submarine programs, and for Force B-3, in the introduction of a mobile ICBM. In all three cases, most of the old ICBM launchers are deactivated and in cases B-1, B-2, the H-II class SSBN is transferred to the forces for peripheral attack. The bomber force is maintained at current levels by the introduction of the Kaz-A in 1975.

Illustrative Force Model C: *Counterforce Against Minuteman*

260. Force C represents the kind of buildup the Soviets might undertake if they were to place top priority on the early acquisition of a capability to knock out virtually all of the US ICBM force. It assumes rapid development and deployment of accurate ICBMs and hard-target MIRVs. This effort would provide in 1976 the theoretical capability of destroying some 90 percent of the US land-based missile force in a pre-emptive surprise attack. As in the case of Force D, however, the Soviets would have to anticipate extremely high levels of damage even after such a strike.

261. The impressive counterforce capability of Force C results primarily from a step up in SS-9 deployment and from the fitting out of the entire SS-9 force with a hard-target 6-MIRV payload, which would begin in 1973 and be completed in 1976. This capability would be augmented by the introduction beginning in the last half of 1974 of an accurate SS-11 (.25 n.m. CEP). In 1975 retaliatory capabilities of Force C would be comparable to those of the B forces: SLBM and bomber developments would be about the same, and more than half of the SS-11 ICBMs would be Mod 2s.

ILLUSTRATIVE FORCE MODEL C
(MID-1975)

	Delivery vehicles	Independently Targeted RVs
ICBMs	1,546	3,496
SS-7	66	66
SS-9	480	2,430
Mod 2	(72)	(72)
Mod 3	(18)	(18)
6 MIRV	(390)	(2,340)
SS-11	900	900
Mod 1	(360)	(360)
Mod 2 (1.0 n.m. CEP)	(340)	(340)
Mod 2 (.25 n.m. CEP)	(200)	(200)
SS-13 Mod 2	100	100
SLBMs	848	872
G-III/SS-NX-8	7/42*	66
H-III/SS-NX-8	1/6	6
Y/SS-N-6	34/544	544
Y/New Missile	16/256	256
BOMBERS	130	
Bear ASM	75	
Bear Bomber	20	
Bison Bomber	10	
Bison Tanker	(50)	
KAZ-A	25	
TOTAL	2,524	4,368

* Some have three MIRVs.

262. If the Soviets should conclude that the US was building a counterforce against their land-based missiles, they might respond with something like Force C to counter the US effort. They might seek to build such a force in any event in an effort to improve their relative strategic position. This would presumably involve the assumption, as with Force D, that the US would not react in such a way as to offset the Soviet effort.

COMPARISON OF ILLUSTRATIVE FORCE MODELS OF SOVIET INTERCONTINENTAL ATTACK FORCES (MID-1975)

	Number of Delivery Vehicles					
	A	B-1	B-2	B-3	C	D
ICBMs	1,302	1,384	1,384	1,713	1,546	1,971
SS-7	66	66	66	66	66	66
SS-9	306	318	318	402	480	480
Mod 1	(48)	.....	.....	(48)	.....	.....
Mod 2	(192)	(60)	(24)	(336)	(72)	(72)
Mod 3	(18)	(18)	(18)	(18)	(18)	(18)
Mod 4 (MRV)	(48)	.....	.....	.....	.....	.....
3 MIRV [a]	.....	(240)	(276)	.....	.....	.....
6 MIRV	.....	.....	.....	.....	(390)	(390)
SS-11	850	900	900	1,100	900	1,200
Mod 1	(340)	(440)	(440)	(600)	(360)	(600)
Mod 2	(510)	(460)	(460)	(500)	(540)[b]	(600)
SS-13 Mod 2	80	100	100	120	100	200
Mobile	.....	.....	.....	25	.....	25
SLBMs	712	848	848	920	848	768
G-III/SS-NX-8	42	42 [c]	42 [c]	42	42 [c]	42 [c]
H-II/SS-N-5	24	.....	.....	24	.....	.....
H-III/SS-NX-8	6	6	6	6	6	6 [d]
Y/SS-N-6	640	544	544	592	544	560
Y/New Missile	.....	256	256	256	256	.....
New SSBN/SS-NX-8	.....	.....	.....	.....	.....	160 [d]
BOMBERS	80	130	130	130	130	190
Bear ASM	65	75	75	75	75	75
Bear Bomber	5	20	20	20	20	30
Bison Bomber	10	10	10	10	10	35
Bison Tanker	(35)	(50)	(50)	(50)	(50)	(50)
KAZ-A	.....	25	25	25	25	50
TOTAL	2,094	2,362	2,362	2,763	2,524	2,929

[a] This MIRV has a CEP of .25 n.m. in Force B-1 and .6 n.m. in Force B-2.

[b] 200 have a CEP of .25 n.m.

[c] Some have three MIRVs.

[d] All have three MIRVs.

Likely Soviet Courses of Action

263. We do not consider either of the illustrative limiting cases to be a likely Soviet course of action. It seems improbable that if the US went ahead with something like its programmed forces, the Soviets would accept the deterioration in their strategic position implicit in *Force A*. It may be, of course, that if the US built forces rapidly enough, the Soviets would have to settle, at least temporarily, for reduced retaliatory capabilities, but we do not think they would do so as a matter of choice. They would almost certainly not limit their forces to the levels of Force A. We also believe that the pace of Soviet technical advance will lead their forces well beyond the limited advances in Force A by the late 1970s. And finally, although the Soviets have been concerned to hold down military spending, we believe that they are unlikely to feel compelled to reduce expenditures for intercontinental forces appreciably below current levels.

264. On the other hand, we consider it unlikely the Soviets will come anywhere close to the levels of effort illustrated by *Force D*, except possibly in response to a US force buildup well beyond that depicted above as representing likely Soviet perceptions of the threat. We think the Soviets would consider the costs to be too heavy and the requisite disruption of other programs too great, the benefits limited in comparison to those of lesser forces against foreseen US developments, and the likelihood of stimulating US counteraction great. Moreover the current pace of Soviet advance in missile technology and deployment does not reflect the sense of urgency that would be apparent if the Soviets were in fact now planning the development of Force D.

265. We also think something like *Force C* would be unlikely. Recent Soviet efforts have been directed primarily at developing systems to penetrate US ABM defenses and give no indication that development of hard target capabilities is to be given increased emphasis. Moreover, we doubt that the Soviets would pursue anything like the single-minded effort to build up counterforce capabilities as rapidly as illustrated in Force C—with the high cost it would entail—unless they felt they could cope more adequately with the US Polaris and bomber threat than appears likely, at least for some time in the future. They would also have to be concerned that the US would react to such a buildup with large, new programs of its own to insure the survivability of adequate retaliatory forces and perhaps to increase US counterforce capabilities as well.

266. Barring an arms control agreement or a significant slowing in projected US strategic programs, we believe that the most likely Soviet course of action would be of the level of effort represented by the *B Group* of forces. Each of these forces has been modeled so as to preserve strong retaliatory capabilities against US forces at levels of expenditure comparable to current levels. By and large these forces represent rough comparability with the US. In actuality, the Soviets could achieve something less or something more than this, depending on who is doing the viewing, on what kind of a B-type force the Soviets deploy, and on the extent to which the US departs from programmed forces in either direction. The Soviets may opt for the introduction of accurate MIRVs (.25 n.m. CEP) as early as possible to match some of the counterforce capabilities inherent in programmed US forces. This objective is best met by *Force B-1*, which introduces accurate MIRVs at the earliest estimated feasible date. Either the guidance or the MIRV development programs could, of course, slip. If the Soviets get an early MIRV but are delayed in attaining significant improvement in accuracy, they might go in direction of *Force B-2*, deploying the MIRV when it becomes available and retrofitting when improved guidance become available. Force B-2 is also rep-

resentative of the kind of force that the Soviets might deploy if they are less concerned with matching the improvements in counterforce capabilities inherent in programmed US forces. If it should take the Soviets until as late as 1975 to finish their flight testing of a MIRV—a delay which we consider much less likely than the delay in attaining improved accuracies—we believe the Soviets would probably attempt to compensate by continuing to build more launchers until a MIRV becomes available. In this case, the Soviet forces in the 1970s might look more like *Force B-3*.

267. But these projections are necessarily illustrative at best. There are various reasons why the Soviets might be willing to settle at least temporarily for rates of force buildup below those illustrated by the B forces. Their lead in numbers of ICBMs present and projected, for example, might lead them to believe they had some extra leeway. On the other hand, some Soviet leaders would doubtless seek larger forces, either because of their commitments to particular weapon programs or because they perceived opportunities to improve the USSR's overall strategic position and bargaining power vis-à-vis the US. In any case, the Soviets are almost certain in the course of the next 5 to 10 years to embark on some strategic programs of which we presently have little or no inkling. As in the past, the Soviets will doubtless make strategic programs decisions which we will find hard to explain in terms of clear cut military or political goals.

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APPENDIX TO SECTION XII

ILLUSTRATIVE FORCE MODELS
BY YEAR 1970-1978

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APPENDIX TO SECTION XII

ILLUSTRATIVE FORCE MODEL PROJECTIONS* BY YEAR 1970-1978

The alternative force developments presented in this Appendix represent possible directions that Soviet intercontinental attack forces could take in the absence of an arms control agreement. It should be emphasized that we consider no one of them an estimate that Soviet intercontinental attack forces will be composed of the particular weapon systems in the precise numbers listed. They are intended only to be illustrative models of possible trends and differing emphases, and as such are not suitable for military planning purposes. For Defense planning purposes the reader should consult the forthcoming Defense Intelligence Projections for Planning (DIPP-71).

* Maj. Gen. Rockly Triantafellu, the Assistant Chief of Staff, Intelligence, USAF, dissents to Section XII and this Appendix. See page 61 for reasons for his dissent.

ILLUSTRATIVE FORCE MODEL A[a]

	1 October 1970	Midyear 1971	1972	1973	1974	1975	1976	1977	1978
ICBMs									
SS-7	190	190	148	106	66	66	30	0	0
SS-8	19	19	12	0	0	0	0	0	0
SS-9	252	282	306	306	306	306	306	306	306
Mod 1	[redacted]	48	48	48	48	48	48	0	0
Mod 2		192	192	192	192	192	192	192	144
Mod 3		18	18	18	18	18	18	18	18
Mod 4 (MRV)		24	48	48	48	48	48	48	48
6 MIRV, .25 nm CEP		0	0	0	0	0	0	48	96
SS-11[b]	810	850	850	850	850	850	850	850	850
Mod 1	810	810	700	580	460	340	220	100	0
Mod 2	0	40	150	270	390	510	630	750	850
SS-13	20	60	80	80	80	80	80	80	80
Mod 1	20	60	60	0	0	0	0	0	0
Mod 2	0	0	20	80	80	80	80	80	80
Mobile ICBM	0	0	0	0	0	0	25	50	75
Total ICBMs	1,291	1,401	1,396	1,342	1,302	1,302	1,291	1,286	1,311

Submarines/SLBMs									
H-II Class/SS-N-5	8/24	8/24	8/24	8/24	8/24	8/24	8/24	8/24	8/24
H-III Class/SS-NX-8	0	0	1/6	1/6	1/6	1/6	1/6	1/6	1/6
G-III Class/SS-NX-8	0	0	2/12	4/24	5/30	7/42	8/48	10/60	10/60
Y-Class/SS-N-6	14/224	21/336	28/448	37/592	40/640	40/640	40/640	40/640	40/640
Total Submarines/SLBMs	22/248	29/360	39/490	50/646	54/700	56/712	57/718	59/730	59/730
Bombers									
Bear with ASM	75	70	70	70	70	65	60	50	40
Bear Bomber	30	30	25	20	10	5	0	0	0
Bison Bomber	35	30	25	20	15	10	5	0	0
Bison Tanker (non-add)	(50)	(50)	(50)	(45)	(40)	(35)	(30)	(25)	(20)
Total Bombers	140	130	120	110	95	80	65	50	40

[a] This force model is illustrative of a possible trend and emphasis, and as such is not suitable for military planning purposes. For Defense planning purposes the reader should consult the forthcoming Defense Intelligence Projections for Planning (DIPP-71).

[b] Does not include SS-11 missiles deployed at MRBM and IRBM complexes.

ILLUSTRATIVE FORCE MODEL B-1 [a]

	1 October	Midyear							
	1970	1971	1972	1973	1974	1975	1976	1977	1978
ICBMs									
SS-7	190	190	148	106	66	66	30	0	0
SS-8	19	10	12	0	0	0	0	0	0
SS-9	252	282	318	318	318	318	318	318	318
Mod 1		48	48	0	0	0	0	0	0
Mod 2		216	252	252	162	60	60	60	0
Mod 3		18	18	18	18	18	18	18	18
3-MIRV, .25 nm CEP		0	0	48	138	240	240	240	240
6-MIRV, .25 nm CEP		0	0	0	0	0	0	0	60
SS-11 [b]	810	850	900	900	900	900	900	900	900
Mod 1	810	810	780	680	560	440	440	440	440
Mod 2	0	40	120	220	340	460	460	460	460
SS-13	20	60	80	100	100	100	100	100	100
Mod 1	20	60	60	60	0	0	0	0	0
Mod 2	0	0	20	40	100	100	100	100	100
Total ICBMs	1,291	1,401	1,458	1,424	1,384	1,384	1,348	1,318	1,318

Submarines/SLBMs									
H-II Class/SS-N-5	8/24	8/24	8/24	8/24	0	0	0	0	0
H-III Class/SS-NX-8	0	0	1/6	1/6	1/6	1/6	1/6	1/6	1/6
G-III Class/SS-NX-8	0	0	2/12	4/24	5/30	5/30	5/30	5/30	0
G-III Class/SS-NX-8 (3-MIRV, .7 nm system CEP)	0	0	0	0	0	2/12	3/18	5/30	10/60
Y-Class/SS-N-6	14/244	21/336	28/448	37/592	37/592	34/544	27/432	18/288	11/176
Y-Class/New Missile (1 RV, .5 nm system CEP)	0	0	0	0	7/112	16/256	23/368	32/512	32/512
Y-Class/New Missile (3-MIRV, .25 nm system CEP)	0	0	0	0	0	0	0	0	7/112
Total Submarines/SLBMs	22/248	29/360	39/490	50/646	50/740	58/848	59/854	61/866	61/866
Bombers									
Bear with ASM	75	75	75	75	75	75	70	65	50
Bear Bomber	30	30	30	30	25	20	10	0	0
Bison Bomber	35	35	35	30	25	10	0	0	0
Bison Tanker (non-add)	(50)	(50)	(50)	(50)	(50)	(50)	(30)	(20)	(20)
KAZ-A	0	0	0	0	0	25	55	90	125
Tanker for KAZ-A (non-add)	0	0	0	0	0	(5)	(20)	(30)	(40)
Total Bombers	140	140	140	135	125	130	135	155	175

[a] This force model is illustrative of a possible trend and emphasis, and as such is not suitable for military planning purposes. For Defense planning purposes the reader should consult the forthcoming Defense Intelligence Projections for Planning (DIPP-71).

[b] Does not include SS-11 missiles deployed at MRBM and IRBM complexes.

ILLUSTRATIVE FORCE MODEL B-2 [a]

	1 October 1970	Midyear 1971	1972	1973	1974	1975	1976	1977	1978
ICBMs									
SS-7	190	190	148	106	66	66	30	0	0
SS-8	19	19	12	0	0	0	0	0	0
SS-9	252	282	318	318	318	318	318	318	318
Mod 1		48	48	0	0	0	0	0	0
Mod 2		216	216	174	84	24	0	0	0
Mod 3		18	18	18	18	18	18	18	18
Mod 4 (3-MIRV, .6 nm CEP)		0	36	126	216	276	276	216	156
6-MIRV, .25 nm CEP		0	0	0	0	0	24	84	144
SS-11 [b]	810	850	900	900	900	900	900	900	900
Mod 1	810	810	780	680	560	440	440	440	440
Mod 2	0	40	120	220	340	460	460	460	460
SS-13	20	60	80	100	100	100	100	100	100
Mod 1	20	60	60	60	0	0	0	0	0
Mod 2	0	0	20	40	100	100	100	100	100
Total ICBMs	1,291	1,401	1,458	1,424	1,384	1,384	1,348	1,318	1,318

Submarines/SLBMs									
H-II Class/SS-N-5	8/24	8/24	8/24	8/24	0	0	0	0	0
H-III Class/SS-NX-8	0	0	1/6	1/6	1/6	1/6	1/6	1/6	1/6
G-III Class/SS-NX-8	0	0	2/12	4/24	5/30	5/30	5/30	5/30	0
G-III Class/SS-NX-8 (3-MIRV, .7 nm system CEP)	0	0	0	0	0	2/12	3/18	5/30	10/60
Y-Class/SS-N-6	14/244	21/336	28/448	37/592	37/592	34/544	27/432	18/288	11/176
Y-Class/New Missile (1 RV, .5 nm system CEP)	0	0	0	0	7/112	16/256	23/368	32/512	32/512
Y-Class/New Missile (3-MIRV, .25 nm system CEP)	0	0	0	0	0	0	0	0	7/112
Total Submarines/SLBMs	22/248	29/360	39/490	50/646	50/740	58/848	59/854	61/866	61/866
Bombers									
Bear with ASM	75	75	75	75	75	75	70	65	50
Bear Bomber	30	30	30	30	25	20	10	0	0
Bison Bomber	35	35	35	30	25	10	0	0	0
Bison Tanker	(50)	(50)	(50)	(50)	(50)	(50)	(30)	(20)	(20)
KAZ-A	0	0	0	0	0	25	55	90	125
Tanker for KAZ-A	0	0	0	0	0	(5)	(20)	(30)	(40)
Total Bombers	140	140	140	135	125	130	135	155	175

[a] This force model is illustrative of a possible trend and emphasis, and as such is not suitable for military planning purposes. For Defense planning purposes the reader should consult the forthcoming Defense Intelligence Projections for Planning (DIPP-71).

[b] Does not include SS-11 missiles deployed at MRBM and IRBM complexes.

ILLUSTRATIVE FORCE MODEL B-3 [a]

	1 October 1970	Midyear 1971	1972	1973	1974	1975	1976	1977	1978
ICBMs									
SS-7	190	190	148	106	66	66	30	0	0
SS-8	19	19	12	0	0	0	0	0	0
SS-9	252	282	318	360	402	402	402	402	402
Mod 1	[redacted]	48	48	48	48	48	0	0	0
Mod 2		216	252	294	336	336	336	246	144
Mod 3		18	18	18	18	18	18	18	18
6-MIRV, .25 nm CEP		0	0	0	0	0	48	138	240
SS-11 [b]	810	850	980	1,080	1,100	1,100	1,100	1,100	1,100
Mod 1	810	810	820	820	720	600	600	600	600
Mod 2	0	40	160	260	380	500	500	500	500
SS-13	20	60	80	100	120	120	120	120	120
Mod 1	20	60	60	60	60	0	0	0	0
Mod 2	0	0	20	40	60	120	120	120	120
Mobile ICBM	0	0	0	0	0	25	75	125	150
Total ICBMs	1,291	1,401	1,538	1,646	1,688	1,713	1,727	1,747	1,772

Submarines/SLBMs									
H-II Class/SS-N-5	8/24	8/24	8/24	8/24	8/24	8/24	8/24	8/24	8/24
H-III Class/SS-NX-8	0	0	1/6	1/6	1/6	1/6	1/6	1/6	1/6
G-III Class/SS-NX-8	0	0	2/12	4/24	5/30	7/42	8/48	10/60	10/60
Y-Class/SS-N-6	14/244	21/336	28/448	37/592	37/592	37/592	37/592	28/448	21/336
Y-Class/New Missile (1 RV, .5 nm system CEP)	0	0	0	0	7/112	16/256	23/368	32/512	39/642
Total Submarines/SLBMs	22/248	29/360	39/490	50/646	58/764	69/920	77/1,038	79/1,050	79/1,050
Bombers									
Bear with ASM	75	75	75	75	75	75	70	65	50
Bear Bomber	30	30	30	30	25	20	10	0	0
Bison Bomber	35	35	35	30	25	10	0	0	0
Bison Tanker (non-add)	(50)	(50)	(50)	(50)	(50)	(50)	(30)	(20)	(20)
KAZ-A	0	0	0	0	0	25	55	90	125
Tanker for KAZ-A (non-add)	0	0	0	0	0	(5)	(20)	(30)	(40)
Total Bombers	140	140	140	135	125	130	135	155	175

[a] This force model is illustrative of a possible trend and emphasis, and as such is not suitable for military planning purposes. For Defense planning the reader should consult the forthcoming Defense Intelligence Projections for Planning (DIPP-71).

[b] Does not include SS-11 missiles deployed at MRBM and IRBM complexes.

ILLUSTRATIVE FORCE MODEL C [a]

	1 October 1970	Midyear 1971	1972	1973	1974	1975	1976	1977	1978
ICBMs									
SS-7	190	190	148	106	66	66	30	0	0
SS-8	19	19	12	0	0	0	0	0	0
SS-9	252	282	318	372	426	480	534	534	534
Mod 1		48	48	0	0	0	0	0	0
Mod 2		216	252	252	162	72	0	0	0
Mod 3		18	18	18	18	18	0	0	0
6-MIRV, .25 nm CEP		0	0	102	246	390	534	534	534
SS-11 [b]	810	850	900	900	900	900	900	900	900
Mod 1	810	810	780	680	560	360	160	0	0
Mod 2 (1 nm CEP)	0	40	120	220	340	340	340	300	100
Mod 2 (.25 nm CEP)	0	0	0	0	0	200	400	600	800
SS-13	20	60	80	100	100	100	100	100	100
Mod 1	20	60	60	60	0	0	0	0	0
Mod 2	0	0	20	40	100	100	100	100	100
Total ICBMs	1,291	1,401	1,450	1,478	1,492	1,546	1,564	1,534	1,534

Submarines/SLBMs									
H-II Class/SS-N-5	8/24	8/24	8/24	8/24	0	0	0	0	0
H-III Class/SS-NX-8	0	0	1/6	1/6	1/6	1/6	1/6	1/6	1/6
G-III Class/SS-NX-8	0	0	2/12	4/24	5/30	5/30	5/30	5/30	0
G-III Class/SS-NX-8 (3-MIRV, .7 nm system CEP)	0	0	0	0	0	2/12	3/18	5/30	10/60
Y-Class/SS-N-6	14/244	21/336	28/448	37/592	37/592	34/544	27/432	18/288	11/176
Y-Class/New Missile (1 RV, .5 nm system CEP)	0	0	0	0	7/112	16/256	23/368	32/512	32/512
Y-Class/New Missile (3-MIRV, .25 nm system CEP)	0	0	0	0	0	0	0	0	7/112
Total Submarines/SLBMs	22/248	29/360	39/490	50/646	50/740	58/848	59/854	61/866	61/866
Bombers									
Bear with ASM	75	75	75	75	75	75	70	65	50
Bear Bomber	30	30	30	30	25	20	10	0	0
Bison Bomber	35	35	35	30	25	10	0	0	0
Bison Tanker (non-add)	(50)	(50)	(50)	(50)	(50)	(50)	(30)	(20)	(20)
KAZ-A	0	0	0	0	0	25	55	90	125
Tanker for KAZ-A (non-add)	0	0	0	0	0	(5)	(20)	(30)	(40)
Total Bombers	140	140	140	135	125	130	135	155	175

[a] This force model is illustrative of a possible trend and emphasis, and as such is not suitable for military planning purposes. For Defense planning purposes the reader should consult the forthcoming Defense Intelligence Projections for Planning (DIPP-71).

[b] Does not include SS-11 missiles deployed at MRBM and IRBM complexes.

ILLUSTRATIVE FORCE MODEL D[a]

	1 October 1970	Midyear 1971	1972	1973	1974	1975	1976	1977	1978
ICBMs									
SS-7	190	190	148	106	66	66	30	0	0
SS-8	19	19	12	0	0	0	0	0	0
SS-9	252	282	318	372	426	480	534	534	534
Mod 1		48	48	0	0	0	0	0	0
Mod 2		216	252	252	162	72	0	0	0
Mod 3		18	18	18	18	18	0	0	0
Mod 4		0	0	0	0	0	0	0	0
6-MIRV, .25 nm CEP		0	0	102	246	390	534	534	534
SS-11[b]	810	900	1,050	1,200	1,200	1,200	1,200	1,200	1,200
Mod 1	810	810	800	700	600	600	400	200	0
Mod 2 (1 nm CEP)	0	90	250	500	600	600	600	600	600
Replacement (3-MIRV, .25 nm CEP)	0	0	0	0	0	0	200	400	600
SS-13	20	60	100	150	200	200	200	200	200
Mod 1	20	60	60	0	0	0	0	0	0
Mod 2	0	0	40	150	200	200	200	200	200
Mobile ICBM	0	0	0	0	0	25	75	125	150
Total ICBMs	1,291	1,451	1,628	1,828	1,892	1,971	2,039	2,059	2,084

Submarines/SLBMs									
H-II Class/SS-N-5	8/24	8/24	8/24	8/24	8/24	0	0	0	0
H-III Class/SS-NX-8	0	0	1/6	1/6	0	0	0	0	0
H-III Class/SS-NX-8 (3-MIRV, .3 nm system CEP)	0	0	0	0	1/6	1/6	1/6	1/6	1/6
G-III Class/SS-NX-8	0	0	2/12	4/24	4/24	4/24	4/24	4/24	0
G-III Class/SS-NX-8 (3-MIRV, .3 nm system CEP)	0	0	0	0	2/12	3/18	4/24	6/36	10/60
Y-Class/SS-N-6	14/224	21/336	28/448	35/560	35/560	35/560	35/560	35/560	28/448
Y-Class/New Missile (3-MIRV, .25 nm system CEP)	0	0	0	0	0	0	0	0	7/112
New SSBN/SS-NX-8 (3-MIRV, .3 nm system CEP)	0	0	0	0	3/48	10/160	19/304	25/400	25/400
Total Submarines/SLBMs	22/248	29/360	39/490	48/614	53/674	53/768	63/918	71/1,026	71/1,026
Bombers									
Bear with ASM	75	75	75	75	75	75	75	70	65
Bear Bomber	30	30	30	30	30	30	25	15	0
Bison Bomber	35	35	35	35	35	35	25	15	0
Bison Tanker (non-add)	(50)	(50)	(50)	(50)	(50)	(50)	(50)	(35)	(25)
KAZ-A	0	0	0	0	0	50	100	150	200
Tanker for KAZ-A (non-add)	0	0	0	0	0	(10)	(35)	(50)	(65)
Total Bombers	140	140	140	140	140	190	225	250	265

[a] This force model is illustrative of a possible trend and emphasis, and as such is not suitable for military planning purposes. For Defense planning purposes the reader should consult the forthcoming Defense Intelligence Projections for Planning (DIPP-71).

[b] Does not include SS-11 missiles deployed at IRBM and MRBM complexes.

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ANNEX A

GLOSSARY OF MISSILE TERMS

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DEPRESSED TRAJECTORY ICBM (DICBM)

An ICBM system launched on a trajectory having a much lower apogee than one launched on a normal ICBM trajectory. The only Soviet DICBM, the SS-9 Mod 3, is retrofired (see definition below) just prior to re-entry to increase the re-entry angle and deboost the re-entry vehicle (RV) onto the desired target.

FRACTIONAL ORBIT BOMBARDMENT SYSTEM (FOBS)

A FOBS is placed into orbit and deorbited on the target prior to completion of the first revolution. Its operational and control requirements are like those for an ICBM; i.e., it is deployed on the ground, targeted prior to launch, and launched with intent to attack. This concept is contrasted with a multiple orbit bombardment system (MOBS) which could be deployed in space, launched into orbit with no immediate commitment to attack, targeted after launch, or retargeted as necessary.

INERTIAL GUIDANCE SYSTEM

A guidance system that is completely contained within the missile and has no link with a ground station after launch.

Accelerometer—A device that measures the missile's acceleration in a given direction. Three accelerometers mounted at right angles to each other can measure the entire acceleration profile of a missile's powered flight.

Gyroscope—A device that measures deviation of the missile away from a reference direction. Three gyroscopes mounted at right angles to each other can measure any movement of the missile during powered flight.

OPERATIONAL CHARACTERISTICS

Alert Rate—The percentage of the operational missile force that is maintained in a condition of readiness.

Circular Error Probable (CEP)—A conventional index of accuracy defined as the radius of a circle centered on the intended target, within which 50 percent of the arriving missile warheads are expected to fall. The other 50 percent of successfully arriving warheads are expected to detonate within 3½ CEPs of the target.

Initial Operational Capability (IOC)—Date the first operational unit is equipped with a few missiles and launchers capable of carrying out an attack.

Maximum Operational Range (n.m.)

(Air-to-Surface Systems)—Slant range between the launching aircraft and the target at the time of missile launch.

(Surface-to-Surface Systems)—Maximum range under operational conditions with warhead weight indicated. In the case of ballistic missiles the maximum range figures disregard the effect of the earth's rotation.

Probability of Kill (PK)—The likelihood that a target will receive in an attack the combined effects deemed necessary to render it useless. In the case of missiles, PK is a function of the hardness of the target, the yield of the attacking warhead, and the accuracy of the delivery system.

Reaction Time—The time required to launch from a given readiness condition. The time required is a function of the type of system, the mode of deployment (i.e., hard or soft), and the check-out procedures used.

Refire Time—The time required to launch a second missile from the same launcher.

RE-ENTRY VEHICLES AND WARHEADS

Re-entry Vehicle (RV)—That part of a missile which carries the warhead and is designed to survive re-entry into the earth's atmosphere and detonate on target.

Multiple RVs (MRVs)—Two or more RVs in a single missile payload package. The individual RVs are dispersed but not independently-targeted or maneuvered.

Multiple Independently-targeted RVs (MIRVs)—Two or more RVs in a single missile payload package, with each RV capable of being directed at a separate aiming point.

Maneuverable RV (MaRV)—An RV which has the capability to maneuver during free flight or re-entry.

Retrofire—A technique whereby the RV is deorbited or is deboosted out of a normal ballistic trajectory.

Ballistic Coefficient (beta)—An RV characteristic whose value is a function of the RV weight and shape and is defined as the weight of the RV divided by its drag coefficient and area. The speed with which an RV passes through the atmosphere increases as the ballistic coefficient increases. An RV having a higher ballistic coefficient is less susceptible to the effects of wind and density in the atmosphere, and the re-entry error induced by these effects is reduced. Re-entry vehicles with lower ballistic coefficients are less susceptible to the effects induced by prior nuclear bursts in the impact area, are more adaptable to hardening against the radiation effects of attacking ABMs, and facilitate the design and packaging of nuclear weapons.

Warhead Weight—The weight of the explosive device and its safing, arming, fuzing, and firing mechanism.

RV Weight—The weight of the warhead plus necessary shielding and structure, of any internal penetration aids that may be present, and of any other necessary or desired components of the RV including hardening.

Throw Weight—The weight of that part of the missile above the last booster stage. In the case of MIRVs or MRVs, for example, throw weight would include the weight of the MIRV or MRV release mechanism as well as that of the RVs.

RELIABILITIES

Force Reliability—The percentage of the operational missile force that, in the absence of countermeasures, will successfully detonate in the target area. This is the product of Alert Rate and Weapon System reliability.

Weapon System Reliability—The percentage of the alert missiles that will successfully detonate within 3.5 CEPs of their targets. This is the product of launch, in-flight, and warhead reliabilities.

ANNEX B

ESTIMATED CHARACTERISTICS AND PERFORMANCE OF SOVIET INTERCONTINENTAL WEAPON SYSTEMS

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CURRENT SOVIET ICBM SYSTEMS ESTIMATED CHARACTERISTICS AND PERFORMANCE

	SS 7		SS 8		SS 9				SS 11			SS 13
	Mods 1 2	Mod 3			Mod 1	Mod 2	Mod 3 (DICBM)	Mod 3 (FOBS)	Mod 4	Mod 1	Mod 2	
IOC	1962 1963	1963	1963		1967	1966	[a]	[a]	[c] (see text)	1966	Late 1970 1971	1969
Maximum operational range (NRE-nm) [b]	6,500	5,500	6,000		7,000	[c]	About 6,000	Not applicable	5,500	5,500	6,000	[d]
Re-entry vehicle weight (pounds)	3,500 ± 500	4,200 ± 500	3,500 ± 500		9,500 ± 750	13,000 ± 1,000	3,000 4,000	3,000 4,000	3 RVs about 3,500 ea.	1,500 ± 300	[e]	About 1,000
Warhead weight (pounds) [f]	2,450 2,800	2,950 3,350	2,450 2,800		6,650 7,600	9,100 10,400	2,100 3,200	2,100 3,200	Each 2,450 2,800	1,050 1,200	About 1,200	About 700 800
Accuracy (CEP-nm)	1.0 1.25	1.0 1.25	1.0		[g]	[g]	1 2	1.5 3	[g]	About 1.0	0.6 0.7	1.0 1.5
Deployment	Soft/hard	.....	Soft hard		Hard	Hard	Hard		Hard	Hard	Hard	Hard
Reliability (percent)												
Weapon system	80	.....	65		85	85	75		80	85	85	85
Alert rate	85	.....	85		90	90	90		90	90	90	90
Force [h]	70	.....	55		75	75	70		70	75	75	75
Launch facility hardness [i] (psi)-against 1 MT weapon												
Silo	500	500	Not computed		500	500	500		500	700	700	1,100
LCC	Not applicable	Not applicable	Not applicable		500	500	500		500	500	500	950 1,350
Time to fire (minutes)	Soft	Hard	Soft	Hard								
From normal readiness	60 180	5 15	60 180	30 45	3 5	3 5	3 5		3 5	0.5 3	0.5 3	0.5 2
From peak readiness	3 5	3 5	5 10	5 10	3 5	3 5	3 5		3 5	0.5 3	0.5 3	0.5 2
Hold time (at peak readiness)	Many hours	Days	About 1 hour	About 1 hour	Unlimited	Unlimited	Unlimited		Unlimited	Unlimited	Unlimited	Unlimited
Refire time	2 4 hours	.....	2 4 hours	.....	.....	.....	.....		.....	.....	.....	.....
Configuration	Two stage	.....	Two stage	.....	Two stage	Two stage	Two stage + deboost deorbit stage		Two stage	Two stage	Two stage	Three stage
Approximate gross lift-off weight (pounds)	325,000	.....	165,000		400,000	400,000	400,000		400,000	100,000	100,000	100,000
Guidance	Inertial	.....	Radio inertial		Inertial	Inertial	Inertial		Inertial	Inertial	Inertial	Inertial
Propellant	Storable liquid	.....	Non-storable liquid		Storable liquid	Storable liquid	Storable liquid		Storable liquid	Storable liquid	Storable liquid	Solid

[a] The SS 9 Mod 3 achieved IOC in late 1969, but it is not known whether it is intended to be used as a FOBS or a DICBM.

[b] With the exception of the SS 9 Mod 3, maximum ranges have been determined by optimizing the flight profiles and rounding off to the nearest 500 n.m. Since the SS 9 Mod 3 (DICBM) flies a depressed trajectory, its flight profile cannot be optimized, and the range given is that which has been demonstrated.

[c] See discussion beginning on page 29, "The Range Problem."

[d] See paragraph 98 on page .

[e] Total payload of the SS 11 Mod 2 is 2,000 pounds. See paragraph 88 on page 37.

[f] Based on analogy with US systems, these warhead weights represent 70 80 percent of the midpoint of the range shown for RV weights, and are rounded. This spread reflects our uncertainty as to how much of a Soviet RV package is devoted to such things as casing, heat shield, etc.

[g] See discussion beginning on page 25, "The Basic Problem of Accuracy."

[h] These reliabilities represent a day-to-day posture. In the case of a generated alert condition, Force Reliability could be improved by no more than 5 percent by increasing the Alert Rate.

[i] The figures given represent the overpressure that would render severe damage to 50 percent of the targets from a 1 MT weapon.

SOVIET SUBMARINE-LAUNCHED BALLISTIC MISSILE SYSTEMS ESTIMATED CHARACTERISTICS AND PERFORMANCE

	SS-N-5	SS-N-6	SS-NX-8
IOC	1963	1968–1969	[a]
Maximum operational range (NRE nm)	700	1,300	About 3,000.
Type and propulsion	Single-stage ballistic, storable liquid.	Single-stage ballistic, storable liquid.	Two-stage ballistic, 2nd stage storable liquid.
Guidance	Inertial	Inertial	Inertial.
Re-entry vehicle weight (pounds)	2,800±500	1,500±500	Possibly about 2,500.
Warhead weight (pounds)[b]	1,950–2,250	1,050–1,200	Possibly about 2,000.
System CEP (nm)[c]	1–2	About 0.7	About 0.75.
Missile CEP (nm)	About 1	About 0.4	About 0.5.
Launch mode	Submerged	Submerged	Submerged.
Reliability (percent)[d]			
Weapon system	80	80	About 80.
Alert rate	95	95	About 95.
Force	75	75	About 75.
Salvo Time (minutes)[e]			
Class — *Number of missiles*			
H-II — 3	6 minutes	—	—
Y — 16	—	4–5 minutes	—
Time to Fire[f]			
From normal readiness	15–20 minutes	15–20 minutes	15–20 minutes.
From peak readiness	6–8 minutes	About 1 minute	About 1 minute.
Hold time (peak readiness)	About 1 hour	About 1 hour	About 1 hour.

[a] At the present rate of flight testing, the SS-NX-8 missile would probably not reach IOC before 1972, but weapon system IOC would depend upon the availability of a launch platform (see paragraphs 138–144).

[b] Based on analogy with US systems, these warhead weights represent 70–80 percent of the midpoint of the range shown for RV weights, and are rounded. This spread reflects our uncertainty as to how much of a Soviet RV package is devoted to such things as casing, heat shield, etc.

[c] System CEP includes both missile errors and submarine position-location errors.

[d] Pertains only to submarines on patrol.

[e] Time from launch of first missile until all missiles are launched.

[f] Time required to proceed from a specified readiness condition to launch, after receipt of order to fire.

SOVIET BALLISTIC MISSILE SUBMARINES
ESTIMATED CHARACTERISTICS AND PERFORMANCE

Class	Maximum Speed Submerged	Approximate Shaft Horsepower	Number Screws and Turns Per Knot	Diving Depth [a] Normal Operations	Collapse Depth	Length	Beam	Displacement	
								Surfaced	Submerged
Y..........	30	60,000	2/9.5	1,300	2,000	425	38	7,500	9,400
H-II.......	26	30,000	2/19.5	1,000	1,500	380	30	4,900	5,900
H-III......	24	30,000	2/21	1,000	1,500	425	30	5,500	6,400
G-III......	12	30,000	Unknown	1,000	1,500	370	30	2,650	3,250

[a] Normal operating depth limit is defined as the depth to which a submarine may proceed an unlimited number of times. During emergencies, a submarine may exceed this depth to an indeterminate point approaching collapse depth and still survive.

SOVIET BALLISTIC MISSILE SUBMARINES ESTIMATED CHARACTERISTICS AND PERFORMANCE

Class	Patrol Characteristics		Patrol Speed	Missiles			Total Salvo Time	Torpedoes		Navigational Accuracy
	Normal [a] Duration	Average Transit Speed		Type	Number	Estimated Range		Number	Type	
Y..........	60	12 [b]	5	SS-N-6	16	1,300	4-5 min	18	Various	0.2 nm
H-II.......	60	12 [c]	5-6	SS-N-5	3	700	6 min	22	Various	0.5 nm
H-III......	60	12 [c]	5	SS-NX-8 [d]	6	~3,000	Unknown	22	Various	0.2 nm
G-III......	60	5	6 [e]	SS-NX-8 [d]	6	~3,000	Unknown	22	Various	Unknown

[a] Patrol duration is defined as the normal length of time that a submarine will remain at sea without replenishment under combat conditions. It is estimated on the basis of crew endurance, general habitability, and consumption of food, spare parts, and other consumables including fuel. Extended patrols will exceed this length of time.

[b] The Y-class has been noted to use an average speed of eight knots while transiting straits, choke points and the GI/UK gap. A 12-knot speed is expected for the remainder of the transit.

[c] The H-class is usually expected to shift to T/E mode of propulsion and slow to about 6-8 knots during transits of restricted passages.

[d] See paragraphs 138-144 for a discussion of the SS-NX-8.

[e] With snorkel.

KANGAROO AS-3 AIR-TO-SURFACE MISSILE SYSTEM ESTIMATED CHARACTERISTICS AND PERFORMANCE

IOC	1960-1961
Maximum range.......	350 nm (Mach 1.8 at altitude of 55,000 feet)
Warhead weight.......	4,500-5,500 pounds
Accuracy (CEP).......	1-3 nm
Carrier aircraft/number of missiles.	Bear/1

SOVIET STRATEGIC BOMBERS PERFORMANCE UNDER AN OPTIMUM MISSION PROFILE

Model	IOC	Gross Weight (pounds)	Speed (knots)/Altitude (feet): Over Target or ASM Launch	Speed (knots)/Altitude (feet): Maximum	Combat Ceiling (feet)	Payload (pounds) Bombs or Missiles	Radius/Range (nm)[a]: High Altitude Unrefueled	Radius/Range (nm)[a]: Subsonic One Refuel	System Reliability (percent)[b]
Bison....... (3-M)	1958	400,000	465/43,000	540/18,000	46,100	25,000	2,800/5,200	3,950/7,300	79-85
						10,000	3,050/5,950	4,150/7,900	
						6,600	3,100/6,050	4,200/8,100	
						3,300	3,150/6,150	4,250/8,250	
Bear A..... (TU-95)	1956	365,000	435/42,000	500/25,000	40,300	25,000	4,150/7,800	...../.....	79-85
						10,000	4,500/8,800	...../.....	
						6,600	4,600/9,000	...../.....	
						3,300	4,700/9,300	...../.....	
Bear B..... (TU-95)	1960	365,000	430/36,000-39,000	500/25,000	41,000	One AS-3 (25,000)	3,950/7,150	5,050/9,200	59-64

[a] The range and radius figures given in this table are maximum figures. They are applicable to the most up to date models of these aircraft, flying optimum mission profiles.

[b] These reliability rates may be high, since the effects of Soviet operational concepts and troop training standards are at least as important as technical characteristics in determination of system reliability, and we have no reliable basis for estimating these effects. These reliabilities are based on the following non-combat attrition rates: (1) 90 percent of the aircraft assigned to home base would be in commission after a 5-10 day standdown prior to initial operations, and would become airborne at launch time; (2) 94 percent of the aircraft airborne would reach the bomb release line directly from home base or from staging base; (3) 95 percent of those aircraft which deploy from home bases to staging bases will successfully launch from the staging base; (4) the reliability rates also assume additional degradation for those requiring in-flight refueling to accomplish their mission: a 98 percent reliability is applied to aircraft equipped with probe and drogue; a 95 percent reliability is applied to aircraft employing wing-tip to wing-tip refueling. The low side of the range given assumes all aircraft are staged and refueled in flight; the high side assumes no aircraft are staged or refueled in flight.

ESTIMATED CHARACTERISTICS AND PERFORMANCE OF THE KAZ-A

Variant	IOC	Speed (knots)/Altitude (feet)		Gross Weight (pounds)	Combat Ceiling (feet)	Payload (pounds) Bombs or Missiles	Radius/Range (nm) [a] (Unrefueled) High Altitude Subsonic
		Over Target/ Over ASM Launch	Maximum				
Free-fall bomber............	1974–1975	495/35,000	1,150/40,000	254,000	44,000	6,600	3,000/5,600 [b]
ASM-carrier................	1974–1975	495/35,000	1,150/40,000	272,000	42,000	14,000 [c]	2,900/5,450 [d]

[a] These radius and range figures are the maximum obtainable by cruising subsonically with wings fully extended at high altitude all the way to the target. We have not computed the refueled radius/range capabilities since a tanker for the Kaz-A has not been identified. One similar in size to the Kaz-A could increase radius/range on the order of 35 percent.

[b] For penetrating areas defended only by subsonic or transsonic fighters, the free-fall bomber variant would more likely cruise subsonically at high altitude (wings fully extended) and make a high altitude supersonic (Mach 2.0) dash (wings swept) of 100 n.m. into the target.

Payload (Bombs)	Radius/Range (Unrefueled)
6,600 pounds	2,100/4,450 n.m.

[c] The air-to-surface missile to be carried by the Kaz-A is unknown. One AS-4 is assumed for analysis.

[d] A likely mission profile for the ASM-carrier would be a high altitude, subsonic cruise (wings fully extended) to within about 200 n.m. of the ASM launch point and a high subsonic (Mach 0.85) low-altitude approach (wings swept) from there to the ASM launch point.

Payload (One ASM)	Radius/Range (Unrefueled)
14,000 pounds	2,650/4,650 n.m.

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