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NUMBER 11-8-66

Soviet Capabilities for Strategic Attack

[ ]

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Submitted by

Richard Helms

DIRECTOR OF CENTRAL INTELLIGENCE

Concurred in by the

UNITED STATES INTELLIGENCE BOARD

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20 OCTOBER 1966

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Mr. William C. Sullivan, Assistant Director, Federal Bureau of Investigation, the subject being outside of his jurisdiction.

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CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

20 October 1966

MEMORANDUM FOR: Recipients of NIE 11-8-66

SUBJECT : Extreme Sensitivity of NIE 11-8-66, "Soviet Capabilities for Strategic Attack"

1. In accordance with the wishes of the President, dissemination of NIE 11-8-66 has been carefully limited because of the extreme sensitivity of the information therein.

2. In this connection, I wish to stress that there be absolutely no reproduction of this Estimate, and that no revelation of its existence be made to unauthorized persons.

Richard Helms

RICHARD HELMS
Director

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SOVIET CAPABILITIES FOR STRATEGIC ATTACK

THE PROBLEM

To estimate the strength and capabilities of Soviet strategic attack forces through mid-1968, and to estimate general trends in these forces over the next 10 years or so.

SUMMARY AND CONCLUSIONS

A. The Soviets retain their belief in the primacy of strategic attack and defense forces, to deter the US and to support their foreign policy. Soviet strategic attack forces will continue to include a variety of weapon systems, with chief emphasis upon ICBMs. The Soviets are building forces which we believe will give them, in the next year or two, greatly increased confidence that they have a retaliatory capability sufficient to assure the destruction of a significant portion of US industrial resources and population. They will probably also seek, through both strategic attack and defense programs, to improve their ability to reduce the damage the US can inflict on the USSR should deterrence fail and war in fact occur. We do not believe, however, that the Soviets will expect to achieve by the mid-1970's strategic capabilities which would make rational the deliberate initiation of general war.[1]

[1] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, believes that developments of the past year reflect a continuing Soviet dissatisfaction with a posture of strategic inferiority vis-a-vis the US and a determination to eliminate such inferiority. He would add the following to the final sentence:

". . . but programs already underway, plus a continuing strong R&D effort, reflect a Soviet determination to rise from a position of strategic inferiority to one of at least numerical parity with the US in the belief that such a posture would markedly enhance the aggressive pursuit of Communist aims."

B. *ICBM Force.* The Soviets now have about 335 operational ICBM launchers. We estimate that the USSR will have some 670-765 operational launchers in mid-1968. This is considerably more than we anticipated in our last estimate and reflects our belief that construction of launchers has been started at a higher rate than ever before.

C. In mid-1968, about half the operational launchers will be for the small and relatively inaccurate SS-11. This missile is suitable mainly against large, soft targets such as cities. Deployment of the SS-9, a large missile more suitable for attacking hard targets, is also continuing, though at a slower rate than the SS-11.

D. The present Soviet stress on dispersed single silos, especially those for the SS-11, probably reflects decisions taken several years ago to improve sharply the survivability and thus the retaliatory capabilities of the ICBM force. In mid-1968 about 80 percent of the total launchers will be hard.

E. The Soviets might not find it advantageous to build ICBM forces much larger than those we estimate for 1968. On the other hand, they might consider their deterrent to be significantly more convincing and their military power improved if they can acquire an ICBM force about as large as that of the US. We therefore estimate a Soviet ICBM force of some 800-1,100 operational launchers in mid-1971 and some 800-1,200 in mid-1976.[3]

F. A 1976 force of about 1,200 launchers would probably consist primarily of small, less expensive ICBMs. A force of 800 or so would probably incorporate greater qualitative improvements and significant numbers of larger ICBMs. Characteristic of future deployment will be hard silos and possibly mobile launchers. Qualitative improvements will probably include much better accuracies and may include sophisticated reentry vehicles and penetration aids. The development of the force will probably be marked by interruptions and leveling-off

[3] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, believes that the Soviets could construct single silo ICBM launchers at a rate which would enable the USSR to achieve numerical parity with the planned US program by 1970.

He would delete the last sentence and substitute the following:

"We estimate a Soviet ICBM force of some 1,000-1,100 operational launchers by 1970-1971. If the USSR develops a MIRV capability, the launcher total may hold at around 1,000-1,200; otherwise, the Soviets probably will have upwards of 1,200 and perhaps 1,500 launchers by the mid-1970's."

phases as new, more effective systems are introduced and older systems are phased out.

G. We think that ICBM forces falling anywhere within these estimated ranges could be considered as meeting a broad Soviet criterion for a credible deterrent. Thus we intend our estimate of future force levels as a range of uncertainty, either side of which would reflect the same basic Soviet strategic concept. For a period so far ahead, however, much will depend on the interplay between US and Soviet decisions taken in the interim.

H. The Soviets have recently conducted feasibility tests of what may be a depressed trajectory ICBM or a fractional orbit bombardment system. We cannot determine which, if either, of these systems will be deployed. Either could become operational during 1968 but probably would not be deployed in large numbers.

I. *MRBM/IRBM Forces.* No major changes in the MRBM/IRBM force have been noted during the past year. We estimate that the current force comprises somewhat over 700 operational launchers, some 135 of them hard, deployed at about 200 sites. This force is capable of delivering a devastating attack against Eurasian targets but is predominantly soft and concentrated. We believe that throughout the period of this estimate the USSR will maintain some 500-700 MRBM/IRBM launchers. Qualitative improvements are expected to include solid propellant missiles, more hard launchers, and probably mobility for some portion of the force.

J. *Missile Submarines.* The Soviets presently have some 45 ballistic missile submarines (8-10 nuclear-powered) with a total of about 130 launchers, and an equal number of cruise missile units (21-23 nuclear-powered) with about 250 launchers. No new ballistic missile submarines have become operational since 1963. We believe, however, that a new class of ballistic missile submarine—which almost certainly will be nuclear-powered and may carry 8 or more missiles with a range of some 1,000 to 2,000 n.m.—will be operational by mid-1968. We estimate that by 1976 the Soviets will have some 60 to 70 ballistic missile submarines, including about 30 of the new type. We believe that production of cruise missile submarines will continue, but

at a reduced rate, into the 1970's. We estimate that some 55-65 of these units will be operational in 1976.

K. Regular open ocean patrols by Soviet missile submarines have been stepped up in recent months. This patrol activity will probably continue to increase. By the early 1970's, as much as 30 percent of the ballistic missile submarine force may be on station in potential missile launch areas at any one time. This number could be augmented by whatever portion of their cruise missile submarine force the Soviets allocate to a strategic attack mission.

L. *Strategic Bomber Force.* Long Range Aviation is now composed of 950-1,000 bomber/tanker aircraft, 200-210 of which are heavies and the rest mediums. The primary mission of the heavies is intercontinental attack; at present, the Soviets could probably put about 100 heavy bombers over US target areas on two-way missions. The medium bombers are mainly for use against Eurasian targets, though a few squadrons might be employed for initial strikes against Alaska, Canada, Greenland, and Iceland. The Soviets could augment the force over North America by using medium bombers on one-way missions, but we think this unlikely. The Soviets may develop a new medium bomber during the period of this estimate, but probably not a new heavy. We estimate that by 1976 attrition and retirement will have reduced the heavy force to some 70-100 aircraft and the medium force to about 300-500.[a]

M. *Space Systems.* For some years the USSR has been orbiting several types of satellites including reconnaissance types. Within the next 5 to 10 years the Soviets will probably develop and employ a variety of space systems (such as navigation and communications satellites) to further support their strategic attack forces. The Soviets

[a] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, believes the Soviets will continue to consider manned strategic aircraft an important element of their intercontinental strike forces. He estimates the USSR has the capability and—considering the currently limited size of the Soviet ICBM force—the requirement for a major manned strategic bomber effort against the US in the event of general war, and could put as many as 400 heavy and medium bombers over US target areas.

He estimates the USSR is likely to introduce both a follow-on heavy bomber and a new medium bomber into LRA within the next few years. He concludes that in 1976 LRA will consist of about 200 heavy bombers and some 400-600 medium bombers of both new and old types.

have long had the capability to orbit a nuclear-armed satellite and have frequently alluded to "orbital rockets." Recent feasibility tests could lead to a multiple-orbit bombardment system. For the foreseeable future, however, ICBMs are likely to be much more effective and far less costly. This, plus the political liability which would be incurred by orbiting a nuclear weapon, lead us to believe that the Soviets are unlikely to deploy a multiple-orbit bombardment system in space during the period of this estimate.

N. *Research and Development.* The Soviets continue to pursue a vigorous R&D program to develop and improve strategic attack systems. A high level of R&D activity is expected to continue. The USSR appears to be about as capable as the US of developing new strategic systems and subsystems which its leaders feel are important enough to justify the expenditure of resources. In deciding to deploy any new weapon system, however, the Soviets would have to weigh the prospective gain against the economic cost and the capabilities of the US to detect and counter it.

DISCUSSION

I. TRENDS IN POLICY AND DOCTRINE

1. The present Soviet political leaders seem more attentive than was Khrushchev to professional military advice, and they have been willing to authorize increases in both military expenditures and manpower. Current military writings reveal a search for ways to broaden the options available to the USSR in the application of its military power. The Soviets are showing increasing interest in improving the capabilities of their general purpose forces to meet contingencies short of general war. At the same time, costly and intensive development of strategic forces is continuing.

2. The Soviets retain their belief in the primacy of strategic attack and strategic defense forces, to deter the US and to support foreign policy. A major element of their policy for many years has been to build strategic attack and defensive capabilities so as to achieve forces which could pose a direct threat to the US and its allies and could defend the Soviet homeland against Western nuclear attack. To this end, the Soviets built a variety of forces to hold Western Europe hostage. Over the years, they developed an intercontinental attack force, at first relying primarily on bombers, then increasingly on ICBMs in soft sites. They are now deploying hardened and dispersed ICBM systems at an accelerated pace. They probably expect that these systems—supplemented by the other elements of their strategic attack forces—will increase the credibility of their deterrent by providing a retaliatory capability sufficient to assure the destruction of a significant portion of US industrial resources and population.

3. We believe that over the next 10 years, Soviet strategic attack forces will include a variety of weapon systems, with chief emphasis upon ICBMs. We expect a considerable strengthening of these forces, particularly their capabilities for survival and retaliation. In addition, they will probably seek, through both offensive and defensive programs, to improve their ability to reduce the damage the US can inflict on the USSR.

4. Since Khrushchev's ouster, there has been some renewal of discussion about preemptive attack in Soviet military writings.[4] In April 1966, Marshal Sokolovskiy stated that "there is an increase in the possibilities for the prompt detection not only of the onset of the attack, but also of the onset of direct preparation of an attack—that is, there are possibilities to prevent a sudden attack." He goes on to imply that a Soviet attack may be directed toward blunting the enemy attack and disorganizing his command and control mechanisms, as well as against the broad economic and military base of the nation. This type of theoretical

[4] By preemptive attack we mean an attack initiated on the conviction that an enemy attack is imminent.

discussion may be intended to provide a rationale for developing strategic attack forces which could contribute to improved damage limiting capabilities.

5. We have considered the possibility of a Soviet attempt to acquire a combination of offensive and defensive forces which would permit a first strike sufficient to limit damage to the Soviet Union to acceptable proportions. Considering the number, hardness, and reaction times of targets to be struck in such an attack, and the likelihood that many would escape destruction, such a Soviet effort would require a large, highly sophisticated missile force, widespread and effective air and missile defenses, and an effective antisubmarine warfare (ASW) capability. In view of the technological and economic magnitude of the task and the likelihood that the US would detect and match or overmatch the Soviet effort, we believe the Soviets would not consider it feasible to achieve, by the mid-1970's, strategic capabilities which would make rational the deliberate initiation of general war.

6. The specific Soviet force goals will be influenced by a wide variety of factors. These could involve, for example, the sheer momentum of deployment programs, attempts to capitalize on some temporary technological advantage, or a psychological urge to match or surpass the US in delivery systems. The large US strategic missile force has almost certainly influenced the USSR to increase its ICBM force and to develop and deploy an antimissile defense system. The Soviets must be aware, however, that current US programming calls for a leveling off of strategic missile deployment within the next year or so; they may see this as offering them the opportunity to catch up with or surpass the US in numbers of ICBM launchers. On the other hand, the prospect of continuing qualitative improvements in US strategic attack forces (e.g., improvements in accuracy, multiple reentry vehicles [RVs], etc.) will require constant Soviet reevaluation of the numbers and types of weapons they need. US deployment of an ABM system would probably elicit an increase in Soviet attack capabilities in a variety of ways, including development of sophisticated RVs and penetration aids. But in any case, the Soviets will probably face great uncertainties in deciding what precise force levels and composition would constitute adequate deterrence.

7. The Sino-Soviet dispute is not likely to affect Soviet programs for strategic attack forces during the period of this estimate. Such plans as the Soviets have developed in recent years have probably considered the possibility of a confrontation with the Chinese. Soviet forces for strategic attack in the Eurasian area are sufficiently large and flexible to deal with Communist China as well as other targets.

8. The Soviets will almost certainly continue intensive R&D on strategic attack systems. They probably regard such an effort, like their other military R&D programs, as imperative in order to prevent the US from gaining a technological advantage and, if possible, to gain some advantage for themselves. Evidence

shows that the Soviets are still intensively developing systems to improve their strategic attack capabilities, especially in the missile field. However, in deciding to deploy any new weapon system they would have to weigh the prospective gain against the economic cost and the capabilities of the US to detect and counter it.

II. INTERCONTINENTAL BALLISTIC MISSILES

A. Recent Deployment Activities

9. The principal new development in Soviet ICBM deployment during the past year has been the starting of launcher construction at a rate higher than ever before. After a possible slowdown during the first half of 1965, the start rate for small single silos was accelerated. However, a delay has occurred in the completion of the small silos and somewhat fewer launchers are now considered operational than were previously estimated. The large silo program has moved ahead about as estimated, although some increase in the start rate probably occurred in this program also. A slight speedup in the pace of construction has been detected at these latter sites and the large silos are being completed about three months earlier than estimated. We do not know how long these trends will continue.

B. Force Levels and Composition to 1968

10. All 224 of the first and second generation ICBM launchers are believed to remain operational. There is no indication of a Soviet effort to modify or phase out older sites. We believe, however, that at least one of the SS-6 sites may have a role in the Soviet military space program.

11. We have identified 25 ICBM complexes, and we believe it highly unlikely that additional complexes remain undetected. On the other hand, we consider it likely that some single silos in early stages of construction at these complexes have escaped detection; we make allowance for this in our estimate. We believe that operational Soviet ICBM strength over the next two years will be comprised solely of the types of systems shown below.

ESTIMATED OPERATIONAL ICBM LAUNCHERS

	1 Oct 1966	Mid-1967	Mid-1968
Soft			
SS-6 [a]	4	3–4	0–4
SS-7	128	128	128
SS-8	14	14	14
Subtotal	146	145–146	142–146
Hard (Triple Silo)			
SS-7 [b]	69	69	69
SS-8	9	9	9
Subtotal	78	78	78
Hard (Single Silo)			
Large (SS-9) [c]	35	70–80	130–140
Small (SS-11) [c]	70–80	130–180	320–400
Subtotal	105–115	200–260	450–540
TOTAL [d]	329–339	423–484	670–765
Tyuratam ICBM Launchers [e]			
Soft	13	15	15
Hard	28	31	34
TOTAL	41	46	49

[a] At least one of these launchers may now be allocated to the Soviet space program.

[b] Thirty of these launchers may be equipped with SS-9s.

[c] These numbers do not reflect the possibility that the Soviets could fit some single silos for an emergency launch capability shortly before they become fully operational.

[e] We estimate that some, say 10, of the launchers at Tyuratam could have an operational as well as R&D and training role. We judge that the other launch facilities at Tyuratam are not normally available for operational use, but they could be prepared to fire ICBMs at the US, the number depending upon the amount of advance notice.

[d] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, believes that inasmuch as operational launchers at Tyuratam pose a threat to target areas in the US[redacted]all Tyuratam ICBM launchers should be included in the operational totals.

For the launchers listed in the table he would substitute:

	1 Oct 1966	Mid-1967	Mid-1968
Field Sites	329–339	423–484	670–765
TTMTR	41	44	44
TOTAL	370–380	467–528	714–809

Large Silos (SS-9)

12. Construction of large single-silos for the SS-9 missile began in early 1964 at six new ICBM complexes. We believe that until late 1965, the construction start rate averaged 10-11 sites per quarter but subsequently increased somewhat to an average of 15-16 sites per quarter. We have now identified about 130 large silos operational and under construction. These silos are deployed in

groups of six, but we believe that each has its own launch control facility and that they can become operational one by one.

Small Silos (SS-11)

13. Construction of small single-silos for the SS-11 missile began in March 1964. The SS-11 program differs from other Soviet ICBM programs in several respects: (a) the silos are smaller and less complex; (b) they are being built in greater numbers; and (c) construction had been started on some 100 deployed sites before the first test firing of the SS-11 missile.

14. Construction of small single-silos is now underway at nine complexes. We believe that until late 1965, construction starts averaged 22-23 sites per quarter, although the rate was not constant and there may have been a slowdown early that year. Subsequently, however, the rate increased to about 50 starts per quarter, and perhaps as many as about 60. We have now identified about 340 small silos operational or under construction at the nine complexes. They are apparently being deployed in groups of 10 with one launch control facility for each group.

C. Operational Capabilities of the ICBM Force [5]

Survivability

15. More than 40 percent of the launchers in the current Soviet ICBM force are soft and are hence highly vulnerable, but the vulnerability of the force is decreasing as hard single-silo sites become the predominant elements. All present types of Soviet hard ICBM sites, including the new single silos, are estimated to have a design overpressure of 200-400 psi.[6] [7] We believe that single-silo sites are so widely dispersed as to present separate aiming points.

Reaction Time

16. Reaction times for current Soviet ICBM systems vary widely according to propellant (cryogenic or storable liquid) and site configuration (soft, multi-silo hard, or single-silo hard). From normal readiness conditions, the times required to fire after the execution order is received are estimated to range from 30 seconds to 3 minutes for the SS-11 system to at least 12 hours for the SS-6. Somewhat more than half of the launchers in the current operational

[5] For performance characteristics of Soviet ICBMs, see Table I.

[6] A hard site is designed to remain *completely operable* at a specified overpressure from given weapon yields. This specified overpressure is called design overpressure. Hardness is the overpressure at which, for given weapon yields, a site becomes *inoperable*. The design overpressure estimated above is for a 10 MT weapon. Hardness will vary with differences in engineering practice and in weapon yield.

[7] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, considers that, given the uncertainties involved, no meaningful estimate of the design overpressure of Soviet hard sites can be made. If a figure is required, he believes that a value of 100-300 psi should be used.

force are capable of firing in 15 minutes or less when at normal readiness; about two-thirds of the estimated operational launchers in mid-1968 will be capable of firing in five minutes or less.

Alternate Targeting

17. We believe that Soviet strategic missile forces are capable of alternate targeting, but that this capability is not as flexible and rapid as in US systems, because of the nature of the guidance systems and the lack of onboard computers.

Reentry Vehicles

18. The Soviets have moved toward RVs with lower ballistic coefficients and larger radar cross section. Such vehicles are less accurate and more vulnerable to detection and interception. On the other hand, they lend themselves to simpler nuclear weapon design and would be more adaptable to terminal guidance (though the latter would require an RV design different from those now employed in the SS-11). Current Soviet RVs may have some inherent hardness against X-rays[ ]

]

Accuracy

19. All present Soviet ICBMs have radio-inertial or all-inertial guidance systems[ ] The best current Soviet ICBM accuracy is represented by the SS-9, which we estimate has a CEP of 0.5-1.0 n.m. now and will probably approach 0.5 n.m. next year with normal product improvement. With its large payload and this accuracy, the SS-9 is suitable for attacking hard targets. The SS-11, though developed somewhat more recently, was evidently intended for a different purpose and does not incorporate as accurate guidance as the SS-9. With its relatively small payload and an estimated present CEP[ ] it is useful mainly against large, soft targets. The very blunt, slow-speed RV of the SS-11 contributes to its inaccuracy. The SS-11 could incorporate accuracy improvements to achieve CEPs[ ] This would require, however, a redesigned RV and a test program covering about two years. We think it unlikely that the Soviets will undertake such a program in light of the probable development of more accurate follow-on systems.

20. We have considered Soviet capabilities to achieve very high ICBM accuracies, focusing mainly on whether and when the Soviets are likely to achieve CEPs of about 0.25-0.5 n.m., to increase the effectiveness of relatively small RVs against small, hard targets. To achieve CEPs in the lower end of this range the Soviets would have to develop new guidance systems, probably featuring midcourse corrections, and to design new RVs for either faster reentry or limited terminal guidance maneuver. These changes could be incorporated into present or follow-on ICBM systems after a development program of about

five years, though in the case of any present system the changes could be such as to constitute for all practical purposes the development of a new system. We would probably detect the testing of such a system one to two years prior to IOC.

21. We think it unlikely that the Soviets have embarked on the development of very high accuracies for their present systems. In the case of SS-11, accuracy was not a critical factor and the Soviet object has clearly been to rapidly develop and deploy a large number of survivable city-busters. In view of past Soviet development practices, the major changes that would be required in the SS-11, and the probable Soviet intent to develop a follow-on ICBM with improvements of various sorts (see later section), it is likely that very high accuracy in a small ICBM would await a new system. In the case of the SS-9, very high accuracy would be required if the Soviets elected to develop an effective MIRV capability against hard targets. In this case, retrofit into the SS-9 force or incorporation into a follow-on large ICBM system would be possible alternatives.

22. We do believe, however, that the Soviets will seek very high accuracies for some future ICBM systems. Considering the techniques required and probable development times, we think that such systems will probably have operational CEPs of about 0.5 n.m. when they reach IOC in the late 1960's or early 1970's. If a decision to achieve an 0.25 n.m. CEP is made soon, these new systems could have this accuracy by about 1972. We have no evidence that the Soviets have made such a decision but consider it likely that they will do so in the next year or so.

Refire

23. We believe that Soviet soft launchers have a refire capability and that on the average two missiles are available for each such launcher. This gives the current force a theoretical refire capability of more than 140 ICBMs some 2-4 hours after the initial launch from soft sites. As soft sites are phased out, this capability will decline. It is unlikely that the hard sites have a refire capability.

D. ICBM Research and Development

Construction Activity at Tyuratam

24. We estimate that there are 55 launchers operational or under construction at Tyuratam. Most of the facilities there can be associated with existing ICBM systems or with the space program, but some of those recently completed or under construction are probably intended for systems still under development. Testing of some new missiles appears likely during the next year or so.

Testing of Current ICBMs

25. Test range firing of all currently deployed ICBMs has continued over the past year. Launches have been made from Tyuratam and, for some ICBMs,

from Plesetsk and Omsk. [

]

Testing of New Systems

26. During the past year the Soviets have been conducting from Tyuratam what we believe to be feasibility tests involving a new and quite different system, which we designate the SS-X-6. This system (the SS-9 booster with a new third stage and RV) has been used in two types of tests. Based on available data, it appears that differing objectives were attempted.

27. On 19 May, the second and third stages and the RV were launched on a 4,600 n.m. ballistic trajectory having an apogee of only 120 n.m. (ICBMs fired to the same range on normal trajectories would reach apogees of 450-680 n.m.). [

] This suggests that this was a test of components and techniques for a weapon system.

28. In September 1966, the same system was used to put the second and third stage and presumably a RV into orbit. We believe that a deorbit attempt occurred during the first orbit and that the vehicle was intended to impact in the normal earth satellite vehicle recovery area in Kazakhstan. At some point the components in orbit disintegrated. We cannot determine whether the deorbit attempt succeeded or failed.

29. These tests could lead to the development of a fractional orbit bombardment system (FOBS) or a depressed trajectory ICBM (DICBM).[8] Both a FOBS and a DICBM could serve to degrade the value of US antimissile detection systems and complicate the US problem of developing effective ABM defenses. Many DICBM trajectories could avoid the ballistic missile early warning system (BMEWS) radar fan. A FOBS could attack from many angles, and possibly pass unidirectional warning or defense systems undetected. Either system would be less effective than ICBMs in terms of CEPs (two miles or more) and deliverable payload, but could be used for surprise attack against a few key soft targets just before the main weight of an ICBM attack penetrated the BMEWS. If the Soviets elect to pursue the development of either DICBMs or FOBS, they would probably be deployed in relatively small numbers to supplement their ICBM forces. IOC could be achieved by late 1967 or 1968.

30. There is no evidence that the Proton booster (SS-X-5) will be developed as a very large ICBM. This booster has been employed in four space launches,

[8] These tests could also be related to the development of a multiple orbit bombardment system (MOBS), see paragraph 102.

three of which were successful, from Tyuratam over the past year and a half. The slow firing rate of the Proton indicates that the Soviets are not pressing the development of this vehicle, whatever its intended role. On this basis, even assuming that the Soviets decide to develop a weaponized version, there probably would not be a very large ICBM operational within the next two years.

31. [ ] The Proton booster probably was in an early R&D phase at that time. Since then, however, there has been a sharp decline in the attention paid to such a capability in Soviet writing and oratory. Considering the difficulty and cost of deploying such a system and the obvious emphasis on other systems, we no longer consider it probable that the Soviets will deploy an ICBM of the size [ ]. However, we still cannot entirely exclude the possibility that an ICBM system will be developed during the late 1960's to carry a very large payload.

Status of Solid Propellant ICBMs

32. There is no evidence that the Soviets have flight tested a complete solid propellant ICBM. In the May 1965 Moscow parade, they displayed a three stage missile design (Savage) which appeared compatible with a small, solid propellant ICBM concept. We think it unlikely that the Savage itself is good enough to warrant development for operational use, but it may be part of a long-term program to develop solid ICBM systems.

33. We have identified six Soviet solid propellant manufacturing and test facilities. We estimate that the development program at these complexes probably did not really get underway until 1964. Solid propellant missiles have been tested at Kapustin Yar to less than ICBM ranges. Some ICBM launchers at Tyuratam could be used for solid propellant missiles. Considering these factors, we think the developmental test firing of solid missiles to ICBM ranges could begin soon. Because the USSR's solid propellant technology evidently lags considerably behind its liquid technology, and because different guidance methods are required, it will probably take the Soviets some time to develop solid ICBMs which are effective enough to warrant deployment. The IOC of a solid system for hard-silo deployment could probably occur two or three years after the start of testing to ICBM ranges. A mobile system could probably achieve IOC somewhat later.

Status of Mobile ICBM Development

34. The Soviets have displayed what they claim to be two mobile surface-to-surface missile (SSM) launchers and have claimed that one of the missiles (Scrooge) has an intercontinental range. We have no information on the missile itself and the size of the canister is more compatible with an IRBM. Hence we doubt that these missiles are prototypes of a mobile ICBM. However,

there is some chance that the USSR will develop a mobile ICBM as another way of increasing the survivability of its ICBM forces. We believe that the SS-11 could be adapted for a mobile system but we consider this unlikely. The [ ] tested thus far to less than ICBM range could be a step in the direction of a solid propellant ICBM; such a system could be used for mobile as well as hard-silo deployment.*

Future Trends in Soviet ICBM R&D

35. [

]

36. The Soviet Union appears to be about as technically capable as the US to develop new ICBM systems and subsystems which its leaders feel are important enough to justify the expenditure of resources. There is no known major technical weakness that would preclude Soviet development of penetration aids, advanced reentry systems, and new guidance techniques.

37. The Soviets have extensive experience in chaff and electronic countermeasures in conjunction with aircraft defense. The Soviets could have exoatmospheric (above 300,000 feet) penetration aids two to four years after starting a development program. The low ballistic coefficients and high observability of present Soviet RVs decrease the effectiveness of endoatmospheric (below 300,000 feet) penetration aids; a terminal decoy program including a suitable RV would probably require at least five years of R&D. A Soviet decision to develop any particular penetration system will depend on their knowledge of the nature of the ABM system the US plans to deploy. Testing of penetration aids, if conducted to ICBM ranges, would probably be detected a year or two before IOC.

38. The development of RVs with increased hardening to withstand nuclear effects is probably well within the Soviet capability. Because of their size and shape, the SS-7 and SS-9 RVs could readily be hardened against a variety of nuclear effects without a significant degradation in yield. The Soviets flew RVs through the region of their high altitude nuclear detonations in 1961 and 1962. These tests, while probably oriented primarily towards the electronic defensive systems problem, gave the Soviets data on the use of nuclear weapons in a precursor role.

39. There is no evidence that the Soviets have initiated an advanced RV program, and we think they are unlikely to do so for penetration alone, unless

* For details [ ] see Section III, "Medium and Intermediate Range Ballistic Missiles."

the US deploys a defensive system. However, the Soviets might, regardless of US programs, develop multiple RVs and multiple independently targeted RVs (MIRVs) for purposes other than as penetration aids, e.g., increasing the numbers of deliverable warheads.

40. A relatively simple multiple RV delivery capability probably could be achieved within 12 months after the start of flight testing. We would expect to detect such a development during the test phase. Development of either MIRVs or maneuverable RVs (MARVs) involves significantly greater complications than multiple RVs, particularly in guidance and control; operational capabilities could probably be achieved about two to three years after flight test began.

41. If the Soviets undertake early implementation of a MIRV program, we think the SS-9 would be the most likely carrier because of its large payload capability. To give it a MIRV capability against hard targets would involve the development of some method to accurately distribute several independent RVs having a combined weight of about 9,000 pounds. Accuracy would be the pacing item and would probably require improvements in boost-phase guidance and the addition of a radio midcourse correction system. If such a MIRV program were to be initiated in the very near future, IOC could be achieved in 1971-1972. We would expect to detect testing of such a system two to three years prior to its IOC. A less accurate SS-9 MIRV system, capable of attacking soft targets, could be attained by 1969. We would expect to see such a system tested about a year prior to its IOC. We consider it unlikely that this latter program would be undertaken in light of the growing capability for attacking soft targets represented by the SS-11 ICBM deployment program.

E. Force Levels and Composition in 1969-1976

42. The many uncertainties involved necessitate a fairly wide range in our estimate of the size and composition of Soviet ICBM forces beyond 1968. The difficulty lies in trying to judge the extent to which the Soviets will emphasize qualitative improvements or numerical growth in their ICBM forces, or both. If, for example, the Soviets were to continue to deploy both current types of single silos at the recent high rates, making no attempt to introduce new systems, and were to retain all current first and second generation launchers, their operational ICBM force would numerically equal the 1,050 ICBM launchers now programmed by the US, sometime in 1969. On this same basis, the Soviet force could be as high as 1,600 operational launchers by mid-1971, and more than 3,000 by mid-1976.

43. There are, however, certain factors which in our view will serve to limit the size of the force in 1971 and 1976 to numbers well below these extremes. Among these are precedents from past Soviet ICBM programming. While the recent construction start rate in the single-silo programs is higher than that

observed in earlier programs, short-term fluctuations above a lower long-term average have been a common feature of Soviet ICBM deployment. Further, deployment starts for any one system have not extended beyond about four years. In this connection, current Soviet ICBM R&D activity is strong evidence that they have not fixed upon their present combination of systems as the optimum one, to be used indefinitely in building their ICBM force. Past Soviet practice makes it seem likely that pauses and interruptions in deployment activity, resulting in plateaus in force levels, would accompany a transition from current to follow-on programs.

44. Such precedents could readily be shattered, however, and we must base our estimate of Soviet ICBM forces beyond 1968 largely on judgments about broad Soviet objectives, the Soviet assessment of the capabilities and vulnerabilities of the force they are now deploying, and the possibilities available to them through current R&D. Anticipated developments in US and Soviet forces, particularly in strategic defenses, will bear significantly on Soviet decisions. Based on present information, we think the Soviets need not plan on an effective US ABM capability until late in the period at best. But they also cannot make a confident calculation of the damage-limiting capabilities of their own ABM defenses over the long term, in light of the US development of penetration aids. Soviet strategic defense, space, and other important national programs will be in continuing competition with the strategic attack forces for resources. It seems certain that any present Soviet decisions about the future size and composition of their ICBM forces will be modified repeatedly in response to changes in resource availability, in US and Soviet military technology, in US forces, and in the general Soviet view of world affairs.

45. We continue to estimate that, through the mid-1970's, the Soviets will regard their ICBM forces as a vital element of a strategic posture designed to deter attack and to provide a powerful buttress to foreign policy. In strategic military terms this calls for a force which can threaten heavy and assured retaliation, and which can also offer—together with their defensive capability—some prospect of reducing damage should deterrence fail and war in fact occur. The Soviet force now being deployed clearly reflects a decision, which must have been reached during the last years of Khrushchev's regime, to deploy a powerful retaliatory capability. The sharp near-term increase in hard silos is attributable largely to deployment of the SS-11, whose estimated payload and accuracy make it suitable only for attacking soft targets, such as cities, not hard counterforce targets. Current deployment programs will probably give the Soviet leadership, by 1967-1968, greatly increased confidence in their assured destruction capability (i.e., a capability, even in the case of a surprise US first strike, to guarantee the devastation of the US in retaliation).

46. In considering the goals of their ICBM program beyond this point, the Soviet leaders will, of course, have examined the possibility of achieving a first

strike counterforce capability which—in conjunction with their strategic defenses—would be sufficient to limit to acceptable proportions the damage which a US retaliatory strike could inflict on the USSR. Conceivably the Soviets could contemplate achieving such a capability, in part by continuing large-scale ICBM deployment, emphasizing missiles with heavy payloads, and incorporating improved guidance and MIRV systems as they can be made available. Considering the number, hardness, and reaction times of targets to be struck in such an attack, and the likelihood that many would escape destruction, such a Soviet effort would require not only a large, highly sophisticated missile force, but also widespread and effective air and missile defenses, and an effective ASW capability. The technological and economic magnitude of the task would be formidable, however, and the Soviets would have to reckon with the likelihood that the US would detect and match or overmatch the Soviet effort. All things considered, therefore, we continue to believe the Soviet leaders do not expect to acquire an ICBM capability sufficient to permit them to launch a first strike against the US without receiving unacceptable damage in return.

47. Thus, strategic military considerations give us reason to believe that the Soviets might not find it advantageous to increase their ICBM force much beyond 670-765 launchers we estimate they will have by mid-1968. On the other hand, the Soviets may build more launchers to add to their damage-limiting capability, or because they want to gain still greater assurance of their retaliatory power, or both. Moreover, we think there is a good chance that, in the view of the Soviet political leaders, the USSR's deterrent would be significantly more convincing and its national power better appreciated if its ICBM force had about as many launchers as the US. This, given the larger payloads of most current types of Soviet ICBMs, would also confer a considerable superiority in megatons. In their propaganda, the Soviets have emphasized the size and payload of their missiles. A goal of rough numerical parity with the US ICBM force as now programmed may seem attainable and attractive to the Soviets.

48. Within the general range of a leveling off in numbers or continued growth to rough numerical parity with the US, the size and composition of the Soviet ICBM force in 1969-1976 will be a function of Soviet decisions about qualitative improvements. In general, we think the Soviets will seek to preserve and improve the survivability of the force and to achieve better capabilities for attack. Most of their present systems lack sufficient accuracy for attacking US hard targets. The SS-7 and SS-8 systems in soft sites have relatively long reaction times and require considerable maintenance effort and expense. Finally, because of their fixed basing, the survivability of even the hardened systems could be degraded by possible future improvements in US weapons.

49. The current R&D activities provide clues as to how the Soviets may improve their capabilities in follow-on systems for use in the late 1960's and early 1970's. Evident Soviet interests include solid-propellant missiles, mobile sys-

tems, and systems with unusual trajectories. Given Soviet technical capabilities and Soviet needs, these considerations lead us to estimate new systems for this time period as follows:

—in 1968-1972, a small, more accurate solid or storable liquid-propellant ICBM in hard and possibly mobile configuration. (A fixed deployment liquid system would be more likely to appear during the early part of this range; solid or mobile systems could probably be achieved somewhat later.) Deployment in fixed sites would provide better alert rates, reliabilities, and reaction times than mobile deployment, and would reduce maintenance requirements as well. Fixed deployment could be by retrofitting into existing silos or in new silos, or both. Mobile deployment would greatly decrease vulnerability, especially if it featured concealment and/or random movement.

—as a possibility for 1970-1972, a new large liquid-propellant ICBM with high accuracy. Such a system would have improved capabilities against hard targets and might incorporate MIRVs after 1972. (An alternative would be continued deployment of the SS-9, incorporating improvements in accuracy and MIRVs, if and as developed.)

—as a possibility for about 1968, a DICBM or FOBS.

50. The probable advent of a follow-on small ICBM system contributes to our belief that the current SS-11 deployment program will have been completed by 1969-1970. SS-9 deployment might continue into the 1970's or be supplanted by an improved system. At the same time, it is likely that the obsolescent SS-6 and SS-8 soft sites will begin phasing out in about 1968, and the remainder of the SS-8 force a year or so later. At some point in about 1969-1971, the Soviets will probably also begin to phase out soft SS-7 sites, and a few years later the remainder of the SS-7 force (by then about 10 years old) will probably be phasing out as well. Thus we believe that new systems will, in part, replace and, in part, supplement the existing force of launchers.

51. Considering the various factors we have discussed, we estimate a Soviet ICBM force of some 800-1,100 operational launchers in mid-1971, and some 800-1,200 in mid-1976.[10] A force near the low side of the range, though including substantial numbers of small single silos and possibly mobile launchers would probably incorporate greater qualitative improvements and significant numbers of large ICBMs, perhaps with sophisticated RVs and penetration aids.

[10] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, would reword this first sentence as follows:

"Considering the various factors we have discussed, we estimate a Soviet ICBM force of some 1,000-1,100 operational launchers by 1970-1971. If the USSR develops a MIRV capability, the launcher total may remain at around 1,000-1,200; otherwise, the Soviets probably will have upwards of 1,200 and perhaps 1,500 launchers by the mid-1970's."

In addition, the phase-out of the second generation hard launchers would probably begin earlier and be completed well before 1976. A force near the high side of the spread would probably consist primarily of small, less expensive ICBMs in single silos and possibly in a mobile configuration and also the retention of second generation hard launchers up to 1976. Toward the end of the period, the emphasis is likely to be on the incorporation of better guidance, penetration aids, and perhaps MIRVs into missiles already deployed, rather than on a sheer increase in numbers.

52. We think that ICBM forces falling anywhere within these estimated ranges could be considered as meeting a broad Soviet criterion for a credible deterrent. Thus we intend our estimates for 1971 and 1976 as a range of uncertainty as to specific numbers and types of weapons, either side of which would reflect the same basic Soviet strategic concept. For a period so far ahead, however, much will depend on the interplay between US and Soviet decisions taken in the interim.

III. MEDIUM AND INTERMEDIATE RANGE BALLISTIC MISSILES

A. Current Force Levels and Composition

53. We have no evidence of additional MRBM/IRBM sites, either under construction or operational, nor any other major changes in the force. Our estimate of the composition of the force through mid-1968 is shown below:

	1 Oct 1966	Mid-1967	Mid-1968
MRBM			
Soft	524	524	524-500
Hard	84	84	84
Subtotal	608	608	608-584
IRBM			
Soft	50	50	50
Hard	51	51	51
Subtotal	101	101	101
Mobile MRBM/IRBM	...	...	0-25
TOTAL	709	709	709-710

54. In addition, there are about 100 fixed field sites, located at or near MRBM complexes. Most of these sites have four potential launch positions but few, if any, permanent facilities. They may serve as training sites or alternate sites; Soviet documents of 1960-1961 discussed the use of alternate sites for refire purposes after the initial salvo from the primary site. There is no evidence that sufficient crews and equipment are available to use both the primary sites and the fixed field positions simultaneously.

B. Capabilities of the force [11]

55. The Soviet MRBM/IRBM force represents a massive capability for attack on Eurasia and especially on European targets. Approximately 90 percent of the force is deployed in a broad belt in western USSR, from the Baltic to the Black Sea. The remainder is mostly deployed in the Far East with a scattering of sites in the Caucasus.

56. Soft launchers are generally deployed four to a site, with two or three sites to a complex. We believe that all the soft launchers have a refire capability. MRBM and IRBM hard sites contain four and three launch silos, respectively. We believe that the hard sites are configured for in-silo launch; they probably do not have a refire capability. Because of their similarities to hard ICBM sites, we continue to estimate that they have the same design overpressure of 200-400 psi (see paragraph 15).[12]

C. Research and Development

57. Two test programs at Kapustin Yar[ ]suggest that a new MRBM/IRBM system is in development.[ ]

58.[ ]a solid propellant missile, has been flight tested six times. Although it has been fired only to the 1,050 n.m. impact area,[ ]the lofted trajectory of the flights suggest a range of about 3,000 n.m.[ ]could achieve IOC in late 1967.

59.[ ]Soviet publications show that the Soviets recognize a requirement for a mobile MRBM/IRBM, and[ ]appears to be the most likely candidate for a mobile role. Hence it is possible that a version[ ]will be deployed with Scamp, or Scrooge, or both.[ ]

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[11] For performance characteristics of Soviet MRBM/IRBMs, see Table II.

[12] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, considers that, given the uncertainties involved, no meaningful estimate of the design overpressure of Soviet hard sites can be made. If a figure is required, he believes that a value of 100-300 psi should be used.

D. Force Levels and Composition in 1969-1976

60. We believe that the size of the Soviet MRBM/IRBM force will remain within the general range of 500-700 launchers throughout the period of this estimate. We do, however, look for changes in the nature of the force during this period, when the obsolescence of the SS-4 and SS-5 systems will probably require the Soviets to carry out a major replacement program. We anticipate that the two most important features of the follow-on systems will be (a) further dispersion in hard sites and (b) mobility.

61. Of these new features, a new missile in hard sites will probably be the first to appear. [ ] will probably begin to replace SS-4 and SS-5 missiles at existing hard sites by the middle of 1968. By 1971, this retrofit program should be completed and additional deployment of new hard single-silo launchers, utilizing existing support facilities, could be well underway, to be completed in its turn by mid-1976.

62. Mobility continues to be emphasized in Soviet statements, and would clearly make the MRBM/IRBM force more flexible and far less vulnerable. Mobile launchers could be concealed and moved at irregular intervals, making it difficult for us to determine their numbers and locations. They could also be shifted to meet a changing threat; for example, some might be deployed along the Chinese border in a period of worsening Sino-Soviet relations.

63. We estimate that by 1976 the present force of SS-4 and SS-5 missiles will have been phased out. The projected force will consist of new missile systems in mobile, multisilo, and single-silo deployment. These systems will be more survivable, more flexible, and more costly than current systems. Considering these factors, and the probable advent of other improved systems for theater force support, the Soviets may conclude that their strategic requirements can be met with a smaller MRBM/IRBM force—say, about 500 launchers. On the other hand, the Soviets may continue to see the need for a force of some 700, if, for example, they considered that the threat from Europe or China had increased.

IV. MISSILE SUBMARINES

64. The present Soviet missile submarine force comprises some 45 ballistic missile submarines with a total of about 130 launchers, and an equal number of cruise missile units with about 250 launchers.

A. Ballistic Missile Submarines

65. Initially, the Soviets intended to employ ballistic missile submarines against a broad range of strategic land targets. A decision was apparently made in 1959 to limit potential targets for ballistic missile submarines to enemy naval bases and support facilities, and to emphasize efforts to counter US carrier

task forces. Accordingly, construction of ballistic missile submarines was terminated and cruise missile submarine production increased. About 1963, however, a new decision was apparently made to augment and diversify Soviet strategic attack forces with an improved submarine-launched ballistic missile system.

66. We believe that a new class of ballistic missile submarine—which almost certainly will be nuclear-powered and may carry eight or more missiles—is under construction. Such a new weapon system would probably employ a new solid or improved liquid-propellant missile having a range of some 1,000-2,000 n.m. Some recent test-firing activity at Kapustin Yar may be related to such a missile, but it is also possible that an appropriate missile has not yet been test fired. In any case, a 1,000-2,000 n.m. missile could probably be ready for installation within about a year from now. Considering necessary systems integration and testing, we think a complete weapon system could become operational by mid-1968.

67. Three other types of ballistic missile submarines are currently operational in the Soviet Navy, the long-range diesel-powered Z-class and G-class and the nuclear-powered H-class. These submarines carry the 350 n.m. SS-N-4 missile system. In 1961, a G-class boat was equipped to fire a new, longer range missile from underwater—the 700 n.m. SS-N-5. A slow paced program is now underway to convert the H-class to fire the SS-N-5, some of the G-class units may be similarly converted.

B. Cruise Missile Submarines

68. Soviet cruise missile submarines—which appeared a few years later than the first ballistic missile units—have a primary mission of countering naval task forces, particularly carrier forces. Cruise missile submarines can be employed against land targets and as the number of these units increase we believe some will be so employed.

69. We believe that cruise missile submarines are being built at three of the four Soviet shipyards now engaged in submarine construction, and 6-9 units are being delivered each year. Of these, 4-6 are nuclear and 2-3 are diesel-powered units. The Soviets probably will continue to build both the nuclear-powered E-II and the diesel-powered J-classes through 1968, but production of the latter units—which are equipped with only four missiles per boat—probably will end soon thereafter. Construction of the more effective E-II-class units with eight missiles per boat probably will continue into the 1970's.

70. All Soviet cruise missile submarines carry the SS-N-3 missile which entered service in 1961. Depending on flight profile, this missile may be fired to ranges up to 450 miles. It has an active radar homing system possibly sup-

plemented by infrared. The missile was designed primarily for use against surface ships, but can also be used against land targets, probably with inertial guidance. The Soviets are still developing improved techniques for employment of the SS-N-3, at least against ships. During the next 10 years, a new type of cruise missile with increased range, speed and accuracy may be produced to further enhance the capabilities of this versatile weapon system.

C. Operational Capabilities [18]

71. Open ocean patrols by Soviet missile submarines—first noted being conducted on a regular basis in 1964—have been stepped up in recent months. The Soviets appear to have gained considerable confidence in the reliability of their nuclear submarines and now send them on frequent open ocean patrols without benefit of surface ship support. As many as five missile submarines have been noted on simultaneous patrols, some of them to patrol areas which, by now, are well established. Ballistic missile submarines still do not deploy to strike stations off the US mainland, but generally cruise within two or three days steaming time of potential launch areas off the US east and west coasts. We estimate that this patrol activity will increase. Because of the lack of forward area bases, however, and operational limitations of their force, the Soviets could probably not keep more than about 30 percent of their ballistic missile submarines continuously on station in potential missile launch areas. We believe that by the early 1970's this may be the normal level of operations. This number could be augmented by whatever portion of their cruise missile force the Soviets allocate to a strategic attack mission.

72. The latest type of nuclear-powered missile submarines operational with the Soviet fleet can reach speeds of about 20 knots and normal operating depths of about 1,000 feet. Using presently available material and technology in a new class of missile submarine, speeds of about 25 knots and operating depths of 1,500 to 2,000 feet probably can be achieved. Significantly greater speed and diving depth capabilities for Soviet missile submarines are not expected during the period of this estimate.

73. Existing Soviet nuclear submarines radiate a substantial amount of noise [redacted] especially at speeds above 10 or 12 knots. When seeking to counter such US systems, the Soviets apparently use the technique of operating at lower speeds. An effective noise reduction program for existing Soviet submarines would require extensive and costly modifications. To attain a relatively quiet submarine over all speed ranges would probably require development of a new class, with redesigned

[18] For performance characteristics of Soviet submarine launched missiles, see Table III. For performance characteristics of Soviet submarines, see Table VI.

internal machinery, a new hull form and a new propeller arrangement. Any new type of submarine will probably incorporate some of these features.

74. We have little evidence on which to base an estimate as to whether the Soviets still rely mainly on celestial and bottom contour methods of navigation. There is evidence, however, of Soviet interest in LORAN C equipment. Several under ice cruises by nuclear submarines suggest the existence of an advanced navigation system, perhaps inertial. New navigation systems will probably be in service soon; these might include a VLF radio system, an earth satellite system, or an inertial system.

75. The Soviets have substantially improved the support for their submarine forces during the past several years. Additional auxiliary ships have been built, new bases have been established, and existing bases have been expanded and hardened. Additional improvements along these lines are expected. The lack of forward area bases, however, will continue to handicap any Soviet effort to maintain a high level of submarine patrols off the US mainland.

D. Future Force Levels

76. Force goals for the missile fleet will be determined in part by future developments in both US and Soviet weapon systems. Our estimates of missile submarine programs take account of the Soviet commitment to their ICBM programs, and their estimated requirements for other types of submarines.[14]

77. We believe that the new type of ballistic missile submarine will enter service by mid-1968 and that about 10 of these units probably will be operational by mid-1971. We estimate that about 30 could be in service by 1976. By then, however, the oldest class of ballistic missile submarines—the Z-conversion—will have been scrapped or placed in reserve. Thus, the total ballistic missile submarine force for 1976 is estimated at 60-70 submarines.

78. If, as we believe, cruise missile submarine construction continues, but at a reduced rate, about 65 of these units will be in service in mid-1971. Construction may stop altogether at about that time. On the other hand, the Soviets may see a strategic attack role for this type, in which case production would continue for several more years. We believe that by 1976, most of the 13 diesel-powered W-class conversions will have been retired from the force. The total number of cruise missile submarines for 1976, then, is estimated at 55-65 with the number remaining on the high side if construction continues into the mid-1970's.

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[14] For our estimates of Soviet torpedo attack submarine programs, see NIE 11-14-66, "Capabilities of Soviet General Purpose Forces," dated 3 November 1966, SECRET.

ESTIMATED SOVIET MISSILE SUBMARINE STRENGTH, 1966-1968

	1 Oct 1966	Mid-1967	Mid-1968
Ballistic Missile Submarines			
Nuclear			
H-I (3 tubes)	5	4–3	3–1
H-II (3 tubes)	3–5	4–7	5–9
New Class (8 or more tubes)	...	...	1
Subtotal	8–10	8–10	9–11
Diesel			
Z-Conversion (2 tubes)	7	7	7
G-I (3 tubes)	27–29	27–29	27–29
G-II (2 tubes)	1	1	1
Subtotal	35–37	35–37	35–37
TOTAL Ballistic Missile Subs	43–47	43–47	44–48
Cruise Missile Submarines			
Nuclear			
E-I (6 tubes)	5	5	5
E-II (8 tubes)	16–18	20–22	24–26
Subtotal	21–23	25–27	29–31
Diesel			
W-Conversion (1 to 4 tubes)	13	13	13
J-class (4 tubes)	9–12	11–15	13–18
Subtotal	22–25	24–28	26–31
TOTAL Cruise Missile Subs	43–48	49–55	55–62

V. LONG RANGE AVIATION

79. Long Range Aviation (LRA) continues to be a significant component of Soviet strategic attack capability. The force now comprises some 950-1,000 bomber/tanker aircraft of which 200-210 are heavies and the remainder, mediums. The heavy bomber/tanker force is believed to have the primary mission of intercontinental attack while the medium force is believed to be mainly for strategic operations against Eurasian targets.[15]

A. Recent Developments in LRA

80. In general, LRA activity during the past year continued to reflect training for the primary missions discussed above. The secondary mission of LRA—

[15] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, considers that because of their range and weapon carrying capabilities, and in view of the currently limited size of the Soviet ICBM force, Soviet medium bombers continue to have a major mission of attack against the US in general war.

naval reconnaissance—continues to be given some emphasis with both heavy and medium bomber aircraft noted in this type of activity during the past year.

81. During the past year, there has been a marginal decline in the force, resulting from slight reductions in the Bison heavy bomber/tanker and Badger medium bomber/tanker components. The introduction of Blinders into the medium bomber force, while continuing, has not been at the rate expected. This delay may be attributable to some dissatisfaction with Blinder, and to problems with the development of the ASM associated with the Blinder B. Evidence acquired over the past year or so indicates that LRA Badgers are again acquiring an ASM capability. This suggests that a new program is underway to prolong the life of the aging Badger by providing a stand-off capability. Such a program may be in response to difficulties encountered with the AS-4/Kitchen ASM for the Blinder B.

B. Aircraft Production

82. The Blinder supersonic-dash medium bomber and the Bear heavy bomber are the only strategic attack aircraft now in production. Bear production is estimated at about one aircraft per month with virtually all going to Soviet Naval Aviation. Although we believe that even this very limited production will end within the next year or so, a Bear modification program may continue somewhat longer, possibly for a new ASM. Blinder production at Plant 22 at Kazan has proceeded slowly, probably because of technical difficulties. Plant 22 is probably now producing the IL-62 Classic transport. In addition, a Badger modification program is also underway there. While it may be possible for all three programs to be carried out simultaneously, there is no Soviet precedent for one plant to produce two different aircraft and modify yet a third type. Nevertheless, we believe Blinder production will continue at the rate of three or four aircraft per month for the next year or so, with the majority going to LRA.[16]

C. Force Levels and Composition to 1968

83. We believe that the Soviets will maintain their heavy bomber/tanker force at about the present level over the next two years. The largest numerical reduction in the near term will be in the medium bomber/tanker component. Phase out of Badgers is evidently at a rate slower than previously estimated,

[16] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, does not consider there is adequate basis for a judgment that Bear and Blinder production will end in a year or so, unless it is assumed that the USSR already is preparing to produce follow-on models. He believes that Soviet efforts to modernize the Soviet long range manned-aircraft capability, as evidenced by limited, but continuing, production of Bear and Blinder, probably will continue until the USSR has decided upon specific follow-on models.

but is still not likely to be offset by the introduction of Blinders. Our estimate of the composition of LRA through mid-1968 is shown below.

STRENGTH OF SOVIET LONG RANGE AVIATION

	1 Oct 1966	Mid-1967	Mid-1968
Heavy Bombers and Tankers			
Bison	90–95	85–95	80–95
Bear	110–115	110–115	105–115
Subtotal	200–210	195–210	185–210
Medium Bombers and Tankers			
Badger	650–675	550–625	450–550
Blinder	95–110	125–150	150–180
Subtotal	745–785	675–775	600–730
TOTAL	945–995	870–985	785–940

84. It is evident that the Soviets view their growing ICBM force as the primary component of their strategic attack capability. Nevertheless, the continued production of Bears, the slow development of the Blinder, and the evidence indicating the development of an ASM capability in the LRA Badger force show that the Soviets consider manned bombers as a necessary adjunct for strategic attack, at least for the near term. Thus, we believe that the Soviets intend to retain sizable bomber forces, but that they will allow those forces to decrease through attrition and gradual retirement of older models.

D. Operational Capabilities [17] [18]

85. The operational capabilities of the aircraft assigned to LRA and analysis of training patterns continue to indicate that an aircraft attack against the US (except Alaska) would involve heavy bombers almost exclusively. We estimate that the Soviets would commit virtually their entire heavy bomber/tanker force of LRA to this mission. Considering the requirements for Arctic staging

[17] Maj. Gen. Jack E. Thomas, Assistant Chief of Staff, Intelligence, USAF, considers this section seriously underestimates the manned aircraft threat to the US. He believes that the Soviet medium bombers still have a major mission of strategic attack against the US.

The USSR possesses a massive capability against Eurasian targets with MR/IRBMs, shorter range missiles, tactical fighters and light bombers, and bombers of Naval Aviation, but currently has only a relatively small ICBM and heavy bomber capability. The Soviet missile submarine force is not known ever to have operated in its potential launch areas off the US coasts. In this situation, the Assistant Chief of Staff, Intelligence, USAF, believes the Soviet leadership recognizes a requirement that medium bombers be prepared to augment other elements of the intercontinental strike forces. If the Soviets elect an all-out attack he estimates they could put about 400 bombers over US target areas, including about 300 medium bombers on range missions.

[18] For performance characteristics of Soviet strategic bomber aircraft and ASMs, see Tables IV and V.

and aerial refueling as well as noncombat attrition, we estimate that at present the Soviets could put about 100 heavy bombers over target areas in the US on two-way missions.

86. We believe that medium bombers do not now figure prominently in Soviet plans for an initial attack on the US (except Alaska). Range limitations of the medium bombers would dictate Arctic staging and aerial refueling for two-way missions against US targets. The success of any attempt to use Badgers against the US would depend, in large part, upon logistics. While LRA has gained extensive flying experience in the Arctic, its capabilities are limited by an Arctic airbase structure which must be supplied almost entirely by sea during the short shipping season. The Soviets have not yet demonstrated a logistics capability to stage a large force (several hundred bombers) quickly through the region. For these reasons, we believe that the Arctic staging bases could not simultaneously support heavy bomber and medium bomber strikes of major proportions. We consider it possible, however, that a few squadrons of Badgers would be employed in attacks on Alaska, Canada, Greenland, and Iceland on two-way missions.

87. The Soviets could further increase the number of bombers arriving over North America should they resort to one-way attacks with medium bombers. Considering the growth in the Soviet ICBM and missile submarine forces we think such use of medium bombers is unlikely.

88. Available information indicates that LRA does not continuously maintain a portion of its force on an airborne or ground alert (i.e., with a reaction time of 15 minutes or less). We estimate that with current manning, LRA could establish and maintain one-third of the force on ground alert; with a slight augmentation in personnel this could be raised to 50 percent.

E. New Aircraft Development

89. There is no evidence which identifies any specific Soviet development program toward a follow-on heavy bomber. Discernible Soviet work in large aircraft is directed primarily toward the development of new transports. This work advances the state-of-the-art and provides a technological and production base which could be applied to bomber development. If the USSR has actively pursued R&D and committed funds for production and deployment, a new subsonic heavy bomber with capabilities slightly better than the Bear could enter service by 1970. On the other hand, they may prolong the life of the Bear by developing a new ASM. We believe that we would obtain indications of the development and production of such an aircraft one to three years prior to its introduction into operational units.

90. Considering the probable growth of Soviet ballistic missile capabilities over the next 10 years, we believe it unlikely that the USSR will introduce a

follow-on heavy bomber into LRA during the period of this estimate.[19] It is possible, however, that Soviet views on the primacy of missiles will change. For example, US deployment of an ABM system might lead them back to the manned bomber as a means of circumventing the new defenses.

91. The requirement which led to the Blinder, and the troubles experienced with the Blinder, may lead the Soviets to develop a follow-on medium bomber. The Soviets could introduce a supersonic-dash medium bomber with better speed, altitude, and radius than the Blinder in the 1972-1975 time period. Alternatively, as a concurrent development with their supersonic transport program, they could introduce a supersonic cruise medium bomber, with a radius about the same as Blinder's, in the same time period.

F. ASM Development

92. Development work on land attack and antiship ASMs continued during the past year. There is some evidence indicating that the Soviets may be improving the AS-3 system. We estimate that the guidance system is being improved. The Soviets are also continuing the development of the Blinder AS-4 system. For land target attack the missile is estimated to cruise at 70,000 to 80,000 feet and terminate in a preprogrammed dive to warhead-burst altitude. Guidance is unknown but could be track/command or inertial. There is some indication that the antiship version may be deployed initially using a maximum cruise speed of about Mach 3.0 to a maximum range of 150 n.m. For this mission we estimate that the guidance system will be track/command with terminal homing.

93. There is no evidence of a new Soviet ASM in development other than the AS-4 and the possible new ASM for LRA Badgers, and we estimate that no new strategic ASM will be operational by mid-1968. The Soviets may decide to adapt the AS-4 to the Bear for both land attack and antiship missions. For the 10 year period the Soviets will have the technical capability to develop new higher performance missiles with inertial guidance systems. The Soviets have the technical capability to develop by 1969 a new turbo-jet ASM having a maximum speed of Mach 2.5 to 3.0 and a range of about 600 n.m. By the early 1970's they also could develop an air launched ballistic missile with a range of about 500 n.m. This latter development is contingent upon the development of a suitable launch aircraft.

G. Force Levels in 1969-1976

94. We estimate that the heavy bomber/tanker force will decline over the next five years to a strength of 150-185, of which 65-80 will be Bisons and 85-105 will

[19] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, believes it is *likely* that a follow-on heavy bomber will be introduced into LRA within the next few years.

be Bears. By 1976, we estimate that a somewhat steeper decline will result in a force of 70-110 of which 30-50 will be Bisons and 40-60 will be Bears. By that time all the Bisons will probably be tankers and all the Bears will probably be ASM equipped.[20]

95. The medium bomber/tanker force will probably decline more rapidly than the heavies. We estimate that by 1971 the medium force will comprise 400-575 aircraft of which 250-350 will be Badgers and 150-225 will be Blinders. We estimate that the decline will continue throughout the period so that by 1976 the force will number 300-500 aircraft, of which 150-250 will be Badgers and the remainder will be Blinders. If the Soviets introduce a new medium 1976 the force will number 300-500 aircraft, of which 150-250 will be Badgers current types rather than being additional to the above strengths.[21]

VI. COMMAND AND CONTROL

96. In peacetime the highest political authority exercises control through the Ministry of Defense, but in the event of war the channel would probably be through a Supreme High Command. The General Staff coordinates planning, targeting, and operations of the separate Soviet strategic attack forces (LRA, missile submarines of the navy, and the SRF), and would in time of war implement the decisions of the Supreme High Command.

97. Operational control of the elements of the strategic attack forces has been organized primarily with the aim of achieving maximum attack capability in minimum reaction time. Operational alert and readiness orders emanating from Moscow apparently flow direct from SRF headquarters to SRF launch complexes, from naval headquarters to missile submarines, and from LRA headquarters to operating divisions. At the same time orders to release nuclear weapons and authorizations to use them would probably be transmitted from the General Staff.

98. Communications of the Soviet strategic attack forces are flexible and redundant and are becoming increasingly reliable and survivable in a wartime

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[20] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, notes that strength of the Soviet heavy bomber/tanker force has remained quite stable for the past several years and he believes the USSR will continue to maintain about 200 such aircraft in operational units, introducing a new heavy strategic aircraft system to support this force level into the mid-1970's. The follow-on system could be an improved Bear with a new ASM (see paragraph 93), or an aircraft ~~development~~ developed from research and development related, in part, to supersonic transports.

[21] Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, expects a more gradual decline in the medium bomber/tanker force than paragraph 95 postulates. He estimates that in 1971 LRA still will include some 600 to 700 mediums, including more than 300 Badgers, over 200 Blinders, and probably the initial increment of a follow-on medium bomber. He believes that in 1976 the medium force will number 400 to 600 aircraft, including not more than 150 Badgers, at least 200 Blinders, and the balance in a growing number of follow-on bombers.

situation. The Soviets continue to harden underground coaxial cables on major links, bypassing major urban centers, and locating underground control bunkers in outlying areas. They are increasing the use of VLF radio for command and control communications; frequencies in this range are relatively invulnerable to blackout in a nuclear environment.

99. We believe that the Soviets will continue to improve their communications systems, concentrating on the development of faster and more secure systems, and increased redundancy. Data systems which are capable of an extremely high information rate can be expected to become even more widespread. The increasing use of communications satellite systems will probably provide additional redundant circuitry for military purposes during the next 10 years.

VII. MILITARY APPLICATIONS IN SPACE

A. Space Weapons

100. The Soviets almost certainly are investigating the feasibility of space weapons, and have long had the capability to orbit a nuclear-armed satellite. Since 1960, they have orbited and recovered an increasing number of satellites in the 10,000-15,000 pound classes. They also have put in orbit a new satellite, Proton, which weighs some 27,000 pounds. The booster used to orbit this payload could put a weapon payload of about 19,000 pounds in near-earth orbit. With a suitable third stage, this booster could put about 50,000 pounds in near-earth orbit.

101. Soviet published statements and writing on the subject dealing with US space programs attribute aggressive designs to the US, and hint that the USSR cannot ignore safely such developments. There has been an increasing number of allusions to "orbital rockets" in Soviet propaganda. In the 1965-1966 parades, the Soviets displayed a vehicle, Scrag, which though described as an "orbital weapon," is not believed capable of performing the mission ascribed to it. In any case, the Soviets seem intent upon convincing both the Western world and their own people that they have some form of an orbital bombardment system.

102. As noted in an earlier paragraph, the recent SS-X-6 feasibility tests could lead to the development of a MOBS.[22] We believe that to develop a reliable and accurate weapon, particularly for out-of-orbit detonation near the earth's surface, would require a series of tests extending over at least a year. After such testing, the USSR probably could orbit a small number of bombardment satellites. They could have CEPs on the order of 2-5 n.m. against targets located within about 100 n.m. of their earth tracks. Orbital lifetimes could range up to a few months.

[22] These tests also could be related to the development of a depressed trajectory ICBM or a fractional orbit bombardment system. See paragraph 29.

103. There are considerable differences in developmental requirements, costs, and effectiveness of various MOBS. To provide a threat of retaliation against population centers, the Soviets might consider a relatively small force of limited effectiveness composed of some 10-25 weapons in orbit. For large-scale use against smaller or harder military targets, however, a much larger and sophisticated force with short times to target, near-simultaneity of delivery, and an accuracy approaching that of ICBMs would be necessary. Even the lesser of these forces would be extremely complex and expensive. It would require a major Soviet effort to perfect new hardware and to develop advanced techniques.

104. For the foreseeable future, we think that MOBS will not compare favorably with ICBMs in terms of effectiveness, reliability, vulnerability, average life, and susceptibility to loss of control due to accident or countermeasures. The Soviet leadership probably would recognize that the orbiting of a nuclear-armed MOBS would be an act of major international import which would intensify greatly East-West hostility and give a strong new stimulus to US military programs. In view of these factors, the much greater cost of such orbital weapons, and Soviet endorsement of the UN resolution against nuclear weapons in space, we believe that the Soviets are unlikely to deploy a MOBS in space during the period of this estimate. However, Soviet technology applicable to this field will improve in the normal course of continued development of nuclear technology, and space projects.

105. We recognize that the Soviets might reach different conclusions as to cost and effectiveness and that altered political considerations in some future phase of East-West relations might lead them to a different decision. Even in these circumstances, we believe that they would regard space weapons primarily as a means of supplementing existing forces, of introducing additional complications into US defense planning, and of supporting Soviet claims to strategic parity or even superiority. In any case, developmental testing of a MOBS should be observable to us at least a year or two prior to attainment of an accurate, reliable system.

B. Military Support Systems

106. The launching of recoverable photoreconnaissance satellites will continue, and this project may come to involve missions of various orbital parameters (e.g., altitude and inclination). There is evidence that in 1962-1963 a photovideo reconnaissance system was under investigation, [redacted] This project has been inactive for several years, but Soviet military authors have written that such a system is needed. Within the next 5 to 10 years, we believe that the

Soviets will attain the capability for near real-time reconnaissance of areas of the world that are near the tracks of their reconnaissance satellites.

107. The high priority evident in the recoverable photoreconnaissance satellite project probably will be applied to other selected military support systems which the Soviet leaders decide are essential. Since 1965 the Soviets have launched three MOLNIYA satellites that have been used for communications and TV relay. They have been collecting meteorological data by satellite. Some of the photoreconnaissance satellites are also performing a geodesy function. We believe that the USSR will develop a navigational satellite within the next few years. Multipurpose vehicles incorporating combinations of these missions are possible, and it may be that both military and nonmilitary interests in such satellites can be accomplished with a single project. A maneuverable satellite for electromagnetic and photographic reconnaissance may also be developed to meet military needs in the next few years. Penetration aid satellites with electronic payloads probably could not be operational until the 1970's because of power requirements.

ANNEX A

TABLES OF WEAPON SYSTEMS CHARACTERISTICS AND PERFORMANCE

GLOSSARY OF MISSILE TERMS

Table I: SOVIET ICBM SYSTEMS CHARACTERISTICS AND PERFORMANCE

Table II: SOVIET MRBM/IRBM CHARACTERISTICS

Table III: SUBMARINE LAUNCHED MISSILE SYSTEMS

Table IV: SOVIET AIR-TO-SURFACE MISSILE SYSTEMS CHARACTERISTICS AND PERFORMANCE

Table V: SOVIET STRATEGIC BOMBER WEAPON SYSTEMS PERFORMANCE UNDER AN OPTIMUM MISSION PROFILE

Table VI: SOVIET MISSILE SUBMARINES ESTIMATED CHARACTERISTICS AND PERFORMANCE

GLOSSARY OF MISSILE TERMS

Initial Operational Capability (IOC)—Date the first operational unit is trained and equipped with a few missiles and launchers.

MAXIMUM OPERATIONAL RANGE (N.M.)

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

Surface-to-Surface Systems—Maximum range under operational conditions with warhead weight indicated. The maximum range figures disregard the effect of the earth's rotation.

ACCURACY

Circular Error Probability (CEP)—The radius of a circle centered on the extended target, within which 50 percent of the arriving missile warheads are expected to fall.

REENTRY VEHICLES AND WARHEADS

Reentry Vehicle (RV)—That part of a missile designed to reenter the earth's atmosphere in the terminal portion of its trajectory.

Multiple RVs—A payload package consisting of two or more RVs. The individual RVs are dispersed (but not independently targeted or maneuvered) during the free flight or terminal portion of the trajectory in order to confuse enemy radars, aid penetration, and/or increase kill area.

Multiple Independently Targeted RV (MIRV)—A payload consisting of two or more RVs each of which is independently targeted.

Maneuverable RV (MARV)—An RV which has the capability to maneuver during free flight or reentry.

Warhead Weight—The weight of the explosive device and its associated fuzing and firing mechanism.

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

Payload Weight—The weight of that part of the missile above the last booster stage.

RANGE CLASSES

Short Range Ballistic Missile (SRBM)
Up to about 600 n.m.

Medium Range Ballistic Missile (MRBM)
About 600 to 1,500 n.m.

Intermediate Range Ballistic Missile (IRBM)
About 1,500 to 3,000 n.m.

Intercontinental Ballistic Missile (ICBM)
About 3,000 to 8,000 n.m.

Fractional Orbit Bombardment System (FOBS)
A system which utilizes a weapon that is put into orbit but reenters short of completing an orbit.

Multiple Orbit Bombardment System (MOBS)
A system which utilizes a weapon that is put into orbit and may be deorbited at any time subsequent to its first orbit.

RELIABILITIES

Launch—The percentage of the missile alert force that will be successfully launched in their normal preparation time with possible delays which do not exceed a total of 30 minutes.

Inflight—The percentage of RVs launched that will successfully arrive within 3.5 CEPs of the intended target.

Warhead—The percentage of warheads arriving in the intended target area which detonate as programmed.

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

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

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

Reaction Time—Time required to proceed from a readiness condition to launch.

Refire Time—Time required to launch a second missile from the same pad or launcher.

READINESS CONDITIONS

Soft Site Readiness Conditions

Condition 3—Launch crew in launch area and on alert. RV and missile mated and checked but still in ready building.

Condition 2—Launch crew at launch station. Missile with RV erected on launch pad. Propellant facilities (liquid) in position, attached, and ready to start propellant loading. Initial guidance alignment and subsystems checkout complete.

Condition 1—Launch crew at launch station. Propellant loading complete. All systems ready for final check and launch sequence.

Hard Site Readiness Conditions

Condition 3—N.A.

Condition 2—Launch crew on alert. Missile with RV mated in place in the silo. Guidance aligned and subsystems checked. Storable liquid missiles loaded. Cryogenic liquid missiles ready for loading.

Condition 1—Launch crew on alert. Propellant loaded, all systems checked and ready for launch sequence.

TABLE I

SOVIET ICBM SYSTEMS CHARACTERISTICS AND PERFORMANCE

	SS-6	SS-7	SS-8	SS-9	SS-11	SS-Small Follow-on*	SS-Large Follow-on**	Depressed ICBM *	FOBS *
IOC	1960	1962	1963	1965	1966	1969–1972*	1970–1972	Late 1967 or 1968	Late 1967 or 1968
Maximum Operational Range (nm)[b]	6,000	6,000	6,000	6,500	5,500	6,000	6,500	About 4,500	Up to one orbit
Reentry Vehicle Weight (lbs.)	7,000–9,000	3,000–4,000 3,600–4,800 (5,000 nm)	3,000–4,000	9,000–11,000 11,500–13,500 (5,000 nm)	[redacted]	[redacted]	[redacted]	About 4,000	About 3,000
Warhead Weight (lbs.)	5,000–7,000	2,400–3,200 2,900–3,800 (5,000 nm)	2,400–3,200	7,000–9,000 9,000–11,000 (5,000 nm)	[redacted]	[redacted]	[redacted]	About 3,200	About 2,400
Warhead Yield (MT)	[redacted]								
Accuracy (CEP–nm)	2.0	1.0–1.5	1.0	0.5–1.0	[redacted]	[redacted]	[redacted]	2.0–3.0	2.0–10.0
Improvement/Year	.....	.....	0.8/1967	0.5–0.75/1967 *	.....	[redacted]	[redacted]	.....	(Dependent on range)
Deployment	Soft	Soft/Hard	Soft/Hard	Hard	Hard (Possibly future mobile)	Hard (Possibly mobile)	Hard	Hard or Soft	Hard or Soft
Reliability (%)*									
Launch	85	85	85	85	90	?	?	?	?
Inflight	85	90	90	90	90	?	?	?	?
Warhead	95	95	95	95	95	?	?	?	?
Weapon System	70	75	75	75	75	?	?	?	?
Alert Rate	80	80 [f]	80 [f]	85	85	?	?	?	?
Force	55	60 [f]	60 [f]	65	65	About 60 70/1975	About 60 65/1975	?	?
Improvement/Year									
Reaction Times									
Readiness Condition 3	At least 12 hrs [e]	Soft 1–3 hrs [e]	Hard ..	Soft 1–3 hrs [e]	Hard ..				
2	1–2 hrs	15–30 min	5–15 min [e]	30–45 min	30–45 min [e]				
1	5–10 min	3–5 min	3–5 min	5–10 min	5–10 min	3–5 min [e]	½ to 3 min [e]	About 1 min [e]	About 1 min [e]	3–5 min [e]	
Hold Time (Condition 1)	About 1 hr	Many hours	Days	About 1 hr		Indefinitely	Indefinitely	Indefinitely	Indefinitely	Indefinitely	Indefinitely

See footnotes at end of table.

SOVIET ICBM SYSTEMS CHARACTERISTICS AND PERFORMANCE (*Continued*)

	SS-6	SS-7	SS-8	SS-9	SS-11	SS-Small Follow-on*	SS-Large Follow-on**	Depressed ICBM ▲	FOBS ▲
Refire Time	At least 12 hrs	2-4 hrs	2-4 hrs	None	None	None	None	..	..
Configuration	Parallel	Two Stage Tandem	Two Stage Tandem	Two Stage Tandem	Two Stage Tandem	Three Stage Tandem*	Two Stage Tandem	Three Stage Tandem	Three Stage Tandem
Approximate Gross Lift-Off Weight (lbs)	500,000	325,000	165,000	440,000	100,000	100,000	500,000	440,000	440,000
Guidance	Radio/ Inertial	Inertial	Radio/ Inertial	Radio/ Inertial ▸	Radio/ Inertial or all Inertial	Radio/ Inertial	Radio/ Inertial	Inertial	Inertial
Propellant	Nonstorable Liquid	Storable Liquid	Nonstorable Liquid	Storable Liquid	Storable Liquid	Solid*	Storable Liquid	Storable Liquid	Storable Liquid

* We cannot discount the possibility that this system could be developed as a two-stage vehicle using storable liquid propellants, in which case IOC could be 1968-1969. Its capability, however, would be about the same as a solid system and thus would present the same threat.

** This missile is a possible development having improved capabilities against hard targets and might incorporate MIRVs after 1972. Alternatively, the Soviets may elect to continue deployment of the SS-9, incorporating improvements in accuracy and MIRVs, if and as developed.

▲ The SS-X-6 system, recently undergoing feasibility testing at Tyuratam, could be a depressed trajectory ICBM or a fractional orbit bombardment system. These estimated characteristics are based on the use of the first and second stages of the SS-9.

▸ Nonrotating earth.

[redacted]

* These reliability rates may be too high since they may not sufficiently take into account the effect of Soviet operational methods and troop training which are at least as important as technical characteristics in determining system reliability. We have no basis for estimating these effects.

‡ May be higher in hard sites.

§ Normal readiness condition.

▸ The SS-9 probably has an additional all-inertial capability with a CEP of about 1 n.m.

TABLE II

SOVIET MRBM/IRBM CHARACTERISTICS

	SS-4		SS-5		Follow-on MRBM/IRBM
IOC	1958		1961		Late 1967
Maximum Operational Range (N.R.E.—nm)	1,020		2,200		About 3,000
Reentry Vehicle Weight (lbs)	2,700–3,700		3,000–4,000		800–2,000
Warhead Weight (lbs)	1,900–2,500		2,400–3,200		600–1,500
Warhead Yield (MT)					
Accuracy (CEP—nm)	1.25		1		About 1.5
Deployment	Soft/Hard Sites		Soft/Hard Sites		Hard Sites/ Mobile
Employment	Strategic—Soft Target Capability		Strategic—Soft Target Capability		Strategic—Soft Target Capability
Reliability (%)					
Alert Rate	80		80		?
Launch	90		85		?
Inflight	90		90		?
Warhead	95		95		?
Weapon System	75		75		?
Force	60		60		About 60
Reaction Time	*Soft*	*Hard*	*Soft*	*Hard*	
Condition 3	1–3 hrs *	..	1–3 hrs *	..	?
2	15–30 min	5–15 min *	15–30 min	5–15 min *	?
1	3–5 min	3–5 min	3–5 min	3–5 min	?
Hold Time (Condition 1)	Many Hours	Days	Many Hours	Days	?
Refire Time	2–4 hrs	..	2–4 hrs	..	?
Configuration	Single Stage		Single Stage		Three Stage
Gross Lift-off Weight (lbs)	About 88,000		About 200,000		?
Guidance	Inertial		Inertial		Inertial
Propellants	Storable Liquid		Storable Liquid		Solid

* Normal readiness condition.

TABLE III

SUBMARINE LAUNCHED MISSILE SYSTEMS

	SS-N-3	SS-N-4	SS-N-5	SSN Follow-on
IOC	1961	1960	1963	1968–1969
Max Range (nm)	450 [a]	350	700	1,000–2,000
Min Range (nm)	12	120	220	..
Speed	Mach. 0.9 to 1.8 [a]	*na*	*na*	*na*
Cruise Altitude (ft)	1,000 to 40,000 [a]	..	..	..
Type and Propulsion	Cruise, Turbo-jet	Single-stage ballistic storable liquid	Single-stage ballistic storable liquid	Solid or storable liquid ballistic
Guidance	Preprogramed autopilot with active radar terminal homing; [b] against land targets, simple inertial	Inertial	Inertial	Inertial
Warhead Weight (lbs)	1,000 to 2,000 Nuclear, high explosive or CW/BW	2,200	1,500–2,500	600–1,000
Warhead Yield (MT)				
CEP	Ship targets: *na* [c] Land targets: 1–2 nm	1–2 nm	1–2 nm	1–2 nm
Launch Condition	Surfaced	Surfaced	Submerged	Submerged
Reliability on Launcher (%)	80	80	80	?
Reliability Inflight (%)	85	80	80	?
Salvo Time: [d]				
Class/missiles per submarine/time	"W-Conv." Class/1, 2, or 4 (2–9 min) "J" Class/4 (5 min) "E-I" Class/6 (10 min) [e] "E-II" Class/8 (15 min) [e]	"Z-Conv." Class/2 (4 min) "G-I" Class/3 (8 min) "H-I" Class/3 (8 min)	"G-II" Class/2 (4 min) "H-II" Class/3 (8 min)	? ?
Reaction Time (min) [f] (Includes min on surface before launch)	20–40 (5 min)	20–40 (3 min)	15–30 (*na*)	? (*na*)

[a] From aerodynamic considerations, various flight profiles are possible, i.e., altitude/speed/range combinations might be: 1,000/0.9/250, 10,000/1.2/350, and 40,000/1.8/450. This system has been subject to upgrading over the years and may not have attained its maximum performance capabilities as of 1966.

[b] There is some possibility that the SS-N-3 terminal homing system may involve an additional infrared homing device as a back-up system.

[c] The hit probability is essentially equal to the functional reliability of its components systems less the probabilities of acquisition and identification. A quantitative estimate of acquisition and identification capabilities cannot be made at this time.

[d] Salvo Time—The time from the launch of the first missile until all missiles are launched.

[e] "E-I" and "E-II" Class SSGN are capable of launching two missiles simultaneously.

[f] Time required to proceed from a specified readiness condition to firing. For submarine launched missiles, time is taken to include the time from the moment of the order to fire to launch of the first missile assuming: (1) the submarine is on alert; (2) targets have been selected; (3) the missile system includes continuous computation of firing data; and (4) the missiles have been checked and are ready for countdown. For surface launched SLBMs submarine time on surface is included in reaction time; for underwater launched missiles submarine time to attain proper launch attitude is included. The actual reaction time of a cruise missile submarine against a target of opportunity would probably be somewhat longer than the time based on these assumptions.

TABLE IV

SOVIET AIR-TO-SURFACE MISSILE SYSTEMS
CHARACTERISTICS AND PERFORMANCE

Characteristics	Kangaroo AS-3	Blinder/AS-4	New ASM For Badger
IOC	1960/1961	1966/1967	By Mid-1967
Maximum Range	350	300 [a]	About 100
Guidance	Preprogramed Autopilot With Command Override	Unknown (Possibly Inertial Or Track Command)	?
Accuracy Against Land Targets (CEP)	1 to 3 nm [b]	1 to 2 nm [b]	?
Warhead Weight (lbs)	5,000[ ]	2,200	?
Warhead Yield (MT)	[ ]		]
Speed (Mach. No)	1.8-2.0	3.0-4 at 80,000 [c]	0.8-1.2
Carrier Aircraft	Bear B and C	Blinder B	?
Number of Missiles	1	1	?
Launch Altitudes (ft)	36,000-39,000	About 40,000	?
Launch Speed	420 Knots	High Subsonic	?
Reliability (%) [d]			
On Launcher	80	80	?
Inflight	70	70	?
Overall	55	55	?

[a] This range applies to attacks against land targets. Against ship targets we estimate a maximum range of 150 n.m.

[b] Against ship targets, a seeker for terminal guidance to reduce this CEP is feasible.

[c] The terminal phase of the flight profile would be at low supersonic speed.

[d] These reliability rates may be high because the effects of Soviet operational concepts and training standards are at least as important as technical characteristics in determination of system reliability. We have no reliable basis for estimating these effects.

TABLE V

SOVIET STRATEGIC BOMBER WEAPON SYSTEMS
PERFORMANCE UNDER AN OPTIMUM MISSION PROFILE

(Calculated in accordance with US Mil-C-5011A Spec except that fuel reserves are reduced to permit a maximum of 30 minutes loiter at sea level, and aircraft operate at altitudes permitting maximum radius/range.)

	BADGER A	BISON	BEAR [a]	BLINDER [b]
Gross Weight (lbs)	167,000	400,000	365,000	185,000
Empty Weight (lbs)	77,150	153,000	151,000	84,900
Combat Radius/Range (nm)[a]				
a. 25,000 lb. bombload	.....	2,800/5,200	4,150/7,800	.....
one refuel	.....	3,950/7,300	.....	.....
b. 10,000 lb. bombload	1,550/2,950	3,050/5,950	4,500/8,800	1,700/3,250
one refuel	2,200/4,150	4,150/7,900	.....	2,350/4,500
c. 6,600 lb. bombload	1,650/3,200	.....	.....	1,800/3,450
one refuel	2,300/4,400	.....	.....	2,400/4,650
d. 3,300 lb. bombload	1,750/3,400	3,150/6,150	4,700/9,300	1,850/3,650
one refuel	2,400/4,600	4,250/8,250	.....	2,500/4,800
e. With ASM				
i. 1xAS-3 (Bear B)	.....	.....	3,950/7,150	.....
one refuel (Bear B)	.....	.....	5,050/9,200	.....
ii. 1xAS-4 (Blinder B)	.....	.....	.....	1,500/2,800
one refuel (Blinder B)	.....	.....	.....	2,150/4,000
f. With 6,600 lb. bombload (Supersonic Dash)	.....	.....	.....	1,300/2,850
one refuel	.....	.....	.....	1,950/4,100
With 3,300 lb. bombload (Supersonic Dash)	.....	.....	.....	1,400/3,050
one refuel	.....	.....	.....	2,050/4,300
With 1xAS-4 (Supersonic Dash) (Blinder B)	.....	.....	.....	1,000/2,100
one refuel	.....	.....	.....	1,600/3,300
Speed Altitude (kts/ft)				
a. Maximum speed at optimum altitude	540/22,000	540/18,800	500/25,000	975/36,000
b. Target speed/target altitude (Subsonic)	475/41,000	465/42,800	435/41,600	560/37,100
c. Target speed/target altitude (Supersonic)	.....	.....	.....	860/46,300
d. Launch speed/launch altitude with ASM	.....	.....	430/39,000	860/42,500
Combat Ceiling (ft)[d]	44,800	46,100	40,300	52,700
System Accuracy (CEP)				
a. Bombing Accuracy [a]				
i. From 40,000 ft	2,000	2,000	2,000	2,000
ii. From 20,000 ft	1,200	1,200	1,200	1,200
b. ASM Accuracy				
i. AS-3	.....	.....	1-2 nm vs. land targets	1-2 nm vs. land targets

See footnotes at end of table.

TABLE V (*Continued*)

	BADGER A	BISON	BEAR [a]	BLINDER [b]
System Reliability (%)[f]				
a. Aircraft reaching target areas in North America unrefueled/refueled [c]	73/69	73/69	73/77	73/69
b. ASM reliability on launcher/inflight/overall	.....	.....	80/70/56	80/70/56
c. Aircraft and ASM overall unrefueled/refueled	.....	.....	41/43	41/39

[a] Bear A is a bomber. Bear B and Bear C are missile carriers equipped with one AS–3/Kangaroo missile. Bear C has slightly reduced performance data from that of Bear B due to different basic weight of aircraft.

[b] Blinder A is a bomber. Blinder B is a missile carrier equipped with one AS–4/Kitchen missile; it is probably not yet operational. Blinder aircraft missions are based on a Mach 1.5, 100 nm dash in and out of target area on radius mission and 100 nm dash in only on range mission. There is no direct evidence of an operational refuel capability for these aircraft at present.

[c] 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. The use of older model aircraft, other mission profiles, indirect routes, low-level penetration or other tactics designed to delay or evade detection and interception would reduce the effective range. The calculation or degradation in range and radius resulting from sophisticated penetration tactics is a complex process which can best be accomplished for individual missions. As a rule-of-thumb for low-level operations of heavy bombers, the radius at optimum altitude will be decreased about 1.6 to 2 miles for every mile flown at sea level.

[d] Associated combat load is 10,000 lbs for Bison and Bear A; 6,600 lbs for Badger A and Blinder A; one AS–3 for Bear B and C; and one AS–4 for Blinder B.

[e] Bombing accuracies indicated are for visual bombing or radar bombing against well-defined targets with free-fall bombs. These figures are not applicable to drogue-retarded bombs, which would be much less accurate.

[f] 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.

[g] Includes the following operational attrition rates, excluding combat attrition: (1) 90% of aircraft at home bases would be in commission after 5–10 day maintenance standdown prior to initial operations; (2) 90% of aircraft in commission at home bases would be launched from staging bases; (3) 90% of aircraft launched from staging bases or directly from home bases or unrefueled missions would arrive in target areas; (4) 85% of aircraft launched on refueled missions would arrive in target areas. Calculations for Bear and ASM are based on refueled flights direct from home bases. All others assume Arctic staging, and refueling of Badger and Bison aircraft. It should be noted that without prior maintenance standdown, the in-commission rate of heavy bombers at home bases would be about 70% and for medium bombers about 60%.

TABLE VI

SOVIET MISSILE SUBMARINES ESTIMATED CHARACTERISTICS AND PERFORMANCE

	Dimensions		Depth		Speed			Armament		Patrol Capabilities		
	Length Beam (Feet)	Displacement (Tons) Surfaced/ Submerged	Normal Operating Depth Limit (Feet) [a]	Collapse Depth (Feet)	Maximum Surfaced	Maximum Snorkel	Submerged Speed Endurance (n.m.)	Torpedo	Missiles	Days on Station	Radius (n.m.) [b]	Patrol Duration (Days) [c]
Ballistic Missile Nuclear SSBN												
"H-I"	380/30	5,000/5,700	900	1,300	20	..	Max 20/*na*	32	3	0	8,600	60
										10	7,200	60
										20	5,800	60
"H-II"	380/30	5,000/5,700	900	1,300	20	..	Max 20/*na*	32	3	0	8,600	60
										10	7,200	60
										20	5,800	60
New Class	410/32	6,000/7,000	1,000	1,500	20	..	Max 20/*na*	32	8 or more	0	8,600	60
										10	7,200	60
										20	5,800	60
Diesel SSB												
"G-I"	320/28	2,300/2,800	900	1,400	18	10.5	Max 16/12 Econ 3.5/175	26	3	0	4,300	60
										10	3,600	60
										20	2,900	60
"G-II"	320/28	2,300/2,800	900	1,400	18	10.5	Max 16/12 Econ 3.5/175	26	2	0	4,300	60
										10	3,600	60
										20	2,900	60
"Z-Conversion"	295/26	2,000/2,400	750	1,100	18	7.0	Max 15/15 Econ 3/150	26	2	0	4,300	60
										10	3,600	60
										20	2,900	60

Cruise Missile												
Nuclear SSGN												
"E-I"	385/30	4,900/5,900	900	1,300	20	..	Max 20/*na*	32	6	0	8,600	60
										10	7,200	60
										20	5,800	60
"E-II"	398/30	5,200/6,200	1,000	1,500	20	..	Max 20/*na*	32	8	0	8,600	60
										10	7,200	60
										20	5,800	60
Diesel SSG												
"J"	280/33	2,700/3,500	1,000	1,500	16	9.0	Max 16/12	26	4	0	4,300	60
							Econ 3/150			10	3,600	60
										20	2,900	60
Long Bin	275/21	1,200/1,500	656	1,000	18	5.5	Max 12/12	12	4	0	2,900	40
							Econ 2.5/125			10	2,200	40
										20	1,400	40
Twin Cylinder	249/21	1,100/1,400	656	1,000	18	5.5	Max 12/12	14	2	0	2,900	40
							Econ 2.5/125			10	2,000	40
										20	1,400	40

[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.

[b] Patrol radius is calculated assuming a speed of advance during transit of six knots for diesel submarines and 12 knots for nuclear submarines as has been determined from extensive evaluation of all available information.

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

ANNEX B

MAPS OF RANGE CAPABILITIES

MRBM/IRBM CAPABILITIES AGAINST THE NORTHERN HEMISPHERE

SUBMARINE-LAUNCHED MISSILE CAPABILITIES AGAINST THE US

RADII OF BISON

RADII OF BEAR

RADII/RANGE OF BADGER

RADII/RANGE OF BLINDER

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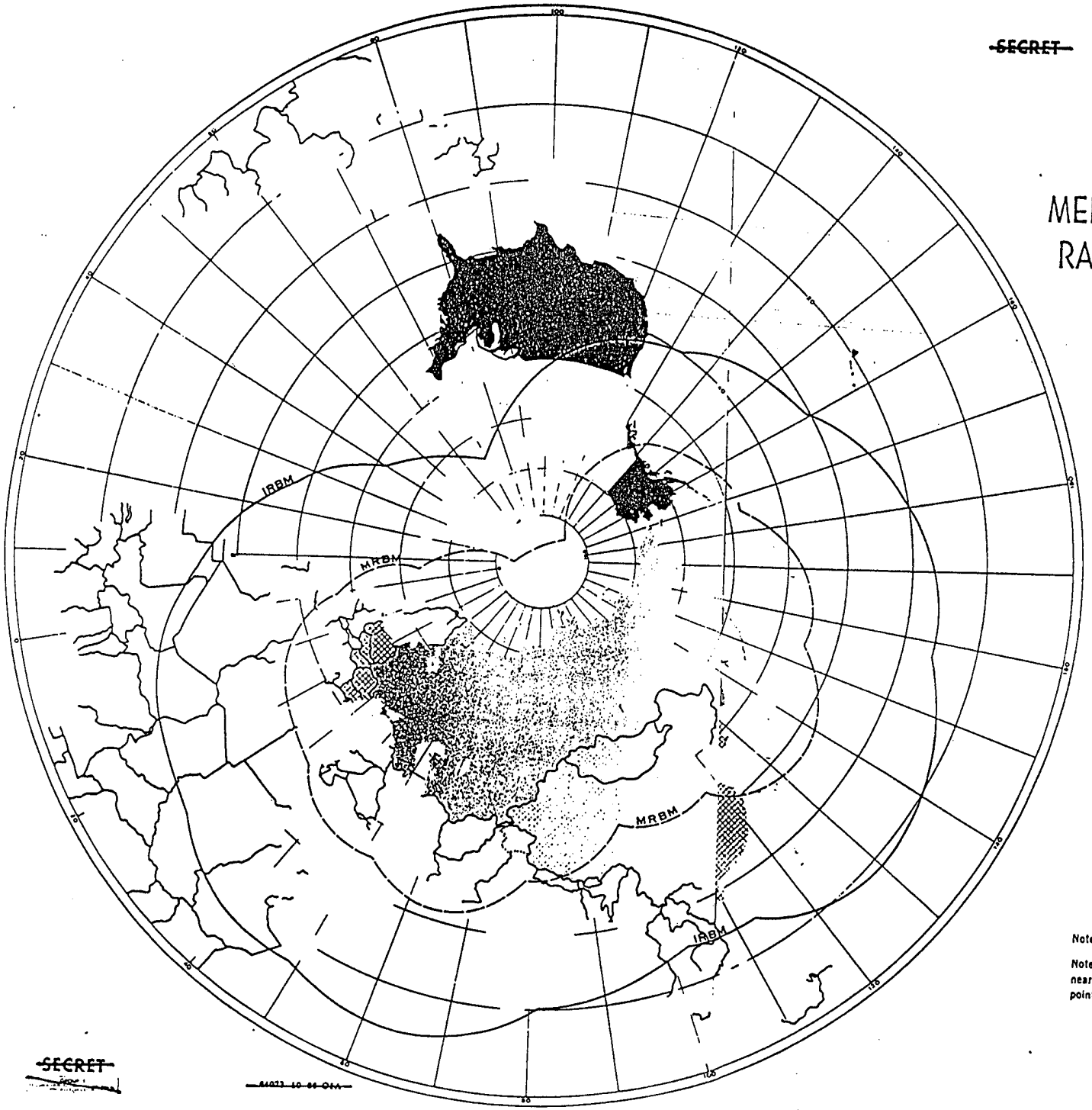
Soviet Missile Capabilities
against Northern Hemisphere

MEDIUM AND INTERMEDIATE RANGE BALLISTIC MISSILES



—— 1020 NM MRBM

—— 2200 NM IRBM

Note 1: Range coverage takes into account the earth's rotation.

Note 2: MRBM and IRBM range lines are measured from points near all borders of the USSR, regardless of suitability of these points for deployment.

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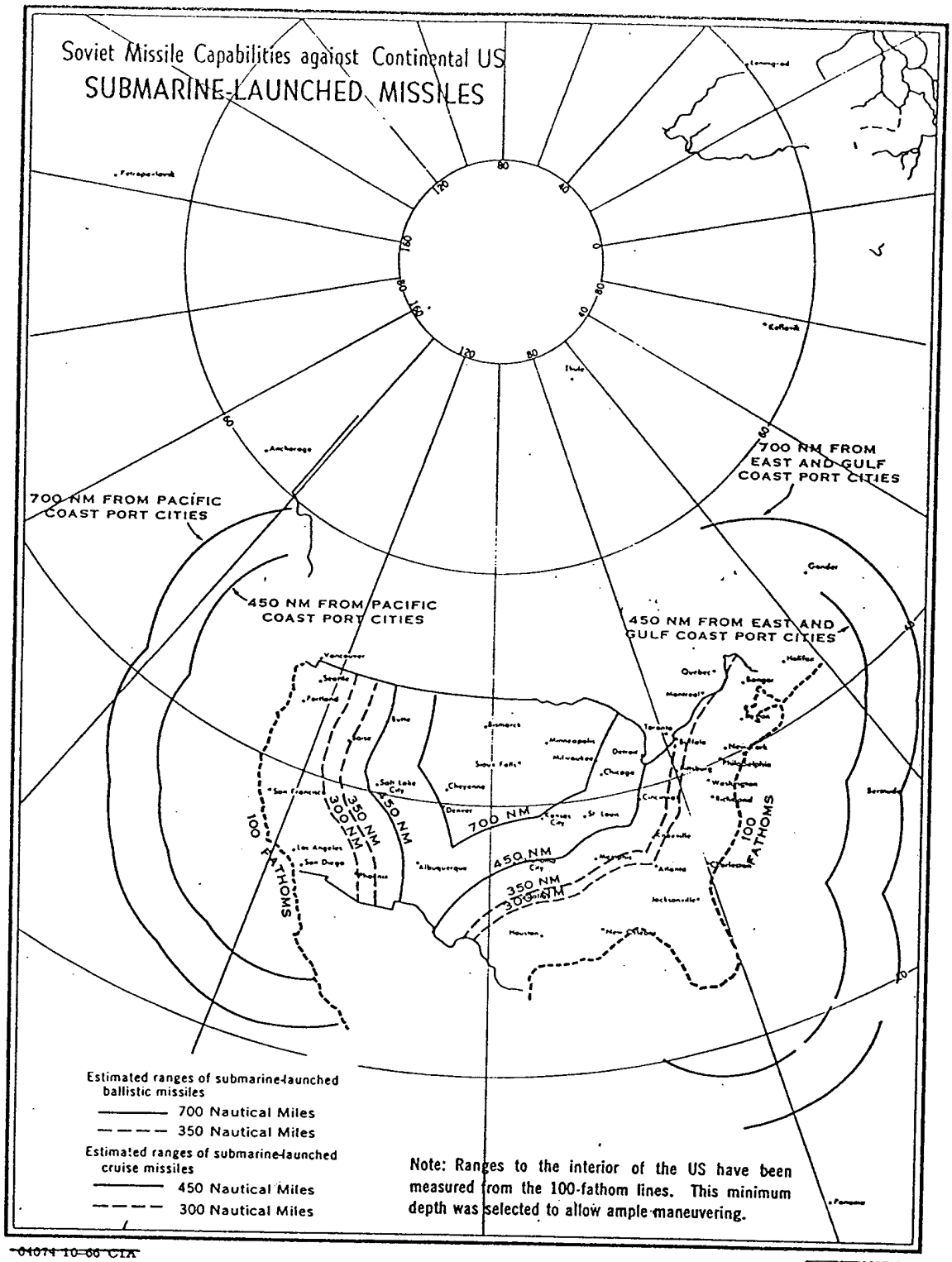

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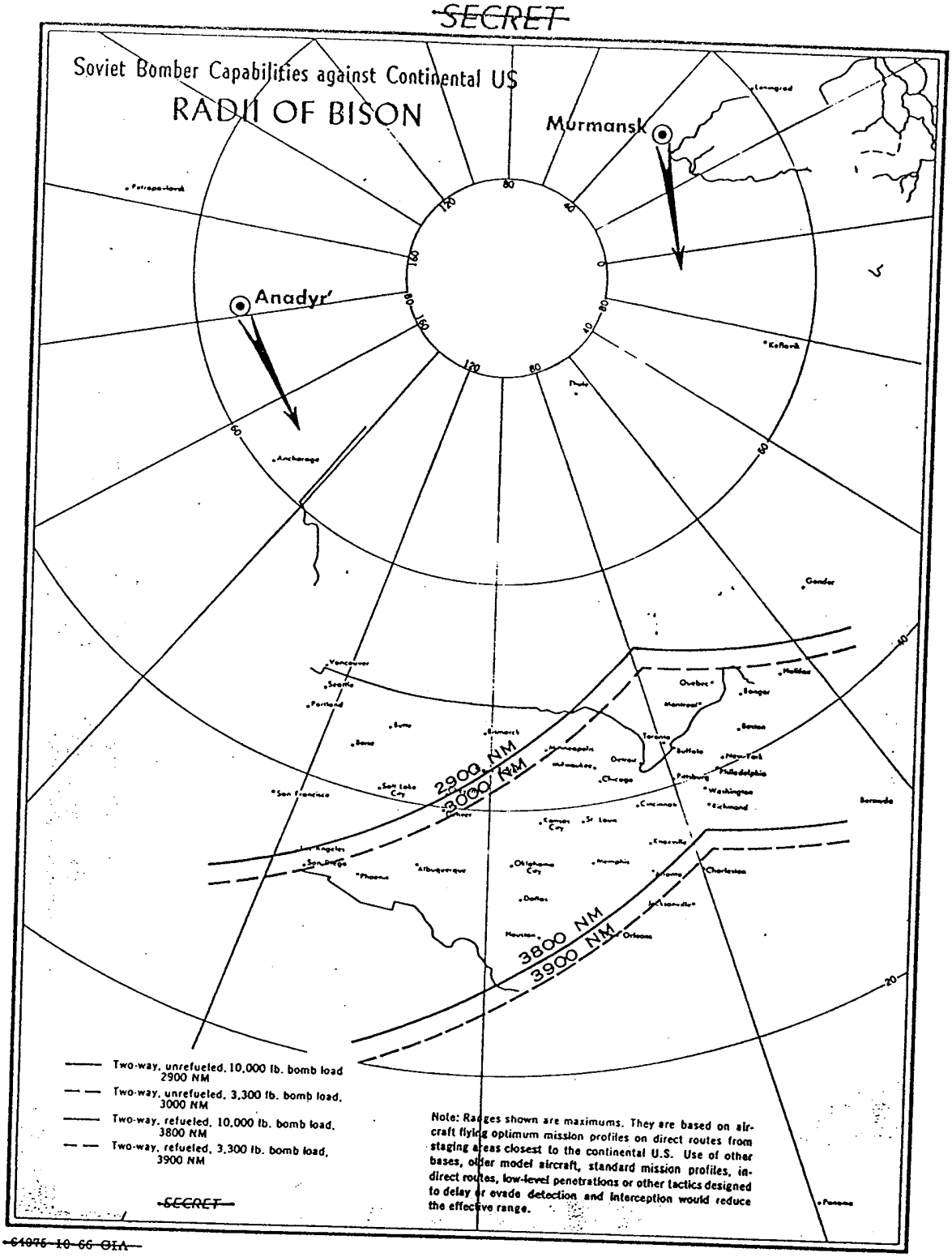

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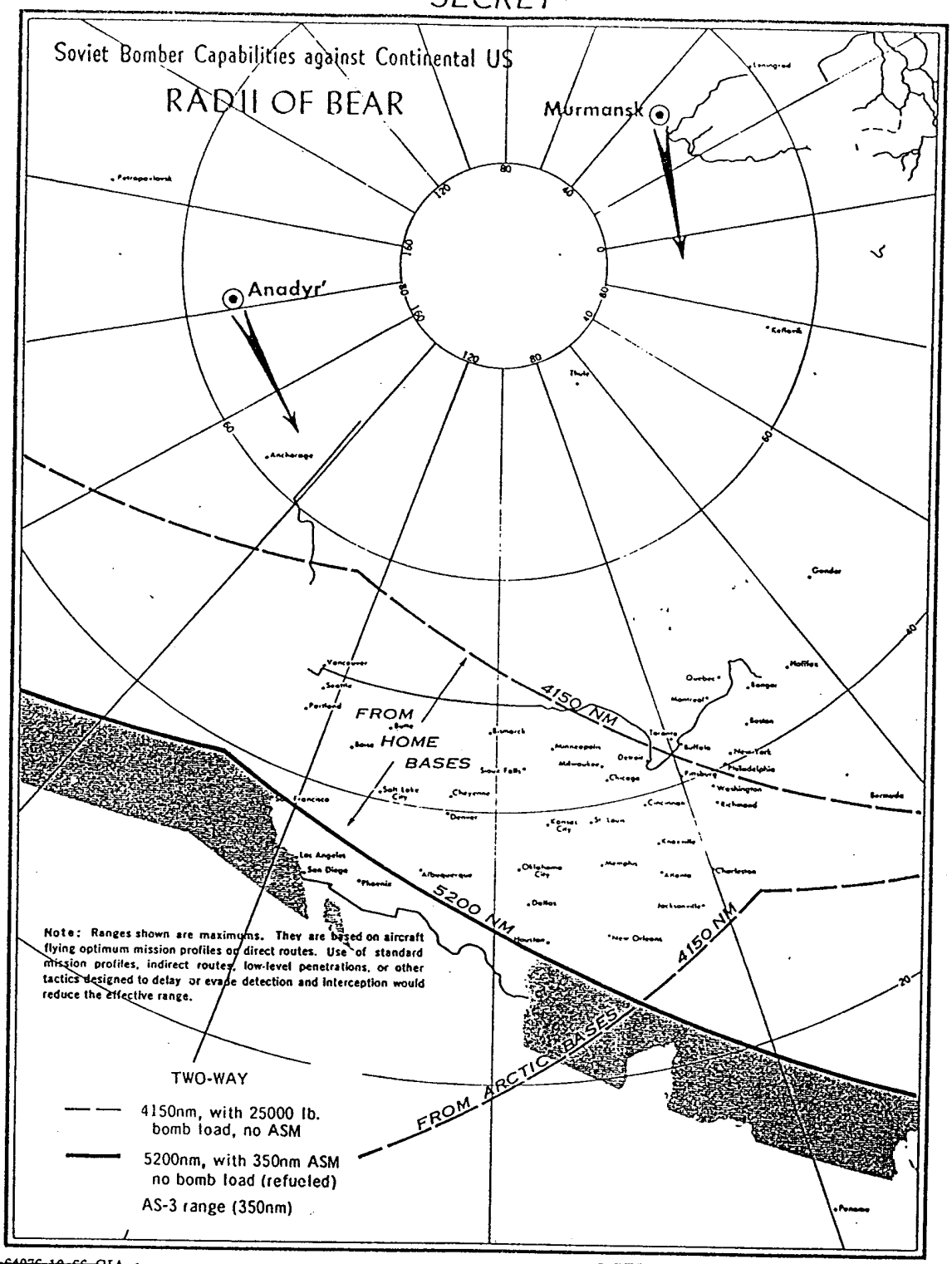

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Soviet Bomber Capabilities against Northern Hemisphere

RADII/RANGES OF BADGER

Two-way unrefueled

——— 10,000 lb. bomb load 1550 NM

– – – 3,300 lb. bomb load 1750 NM

Two-way refueled

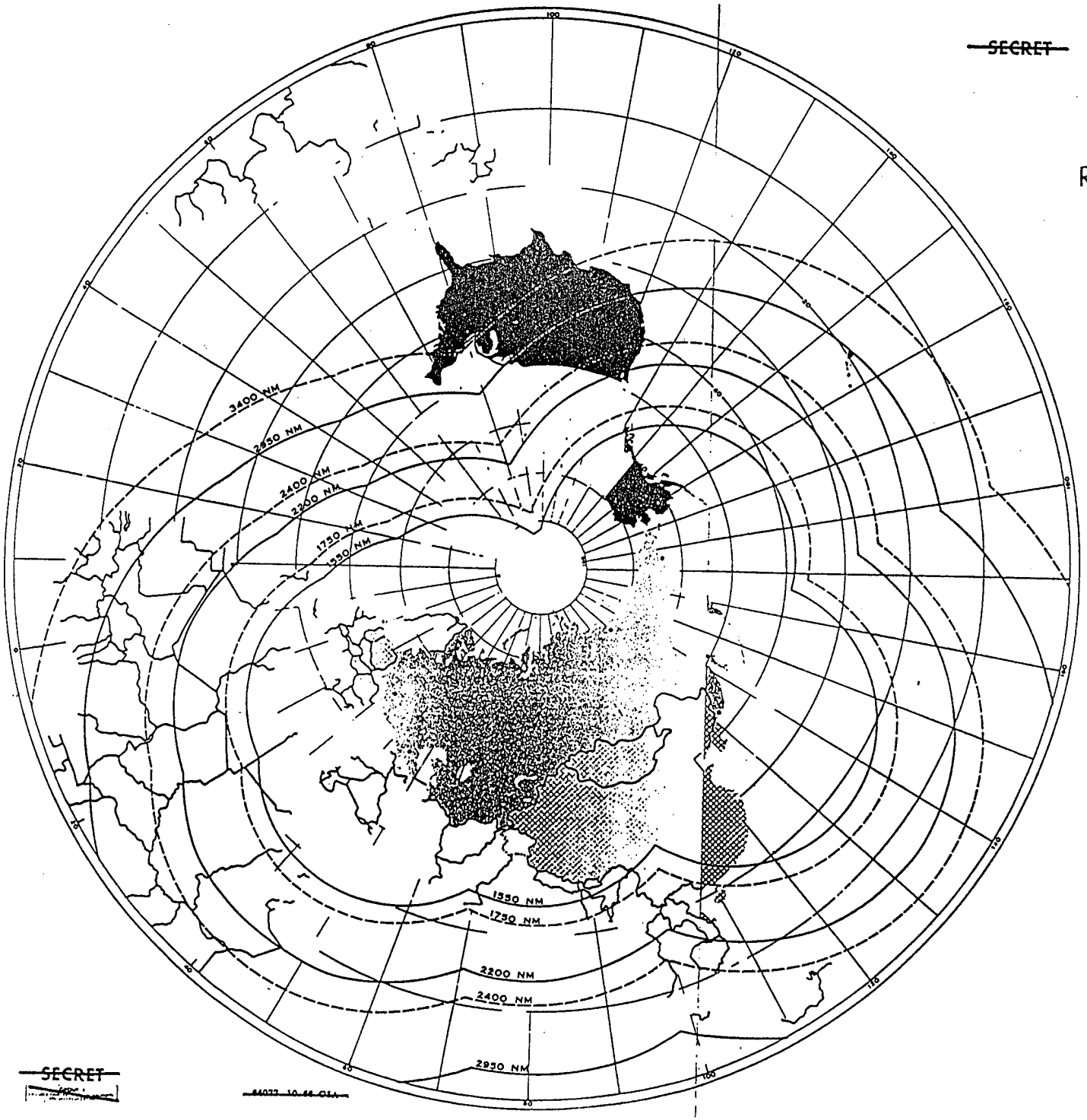
——— 10,000 lb. bomb load 2200 NM

– – – 3,300 lb. bomb load 2400 NM

One-way unrefueled

——— 10,000 lb. bomb load 2950 NM

– – – 3,300 lb. bomb load 3400 NM



Note: Ranges shown are based on aircraft flying optimum mission profiles on direct routes. Use of other profiles, indirect routes, low-level penetrations, or other tactics designed to delay or evade detection and interception would reduce the effective range.

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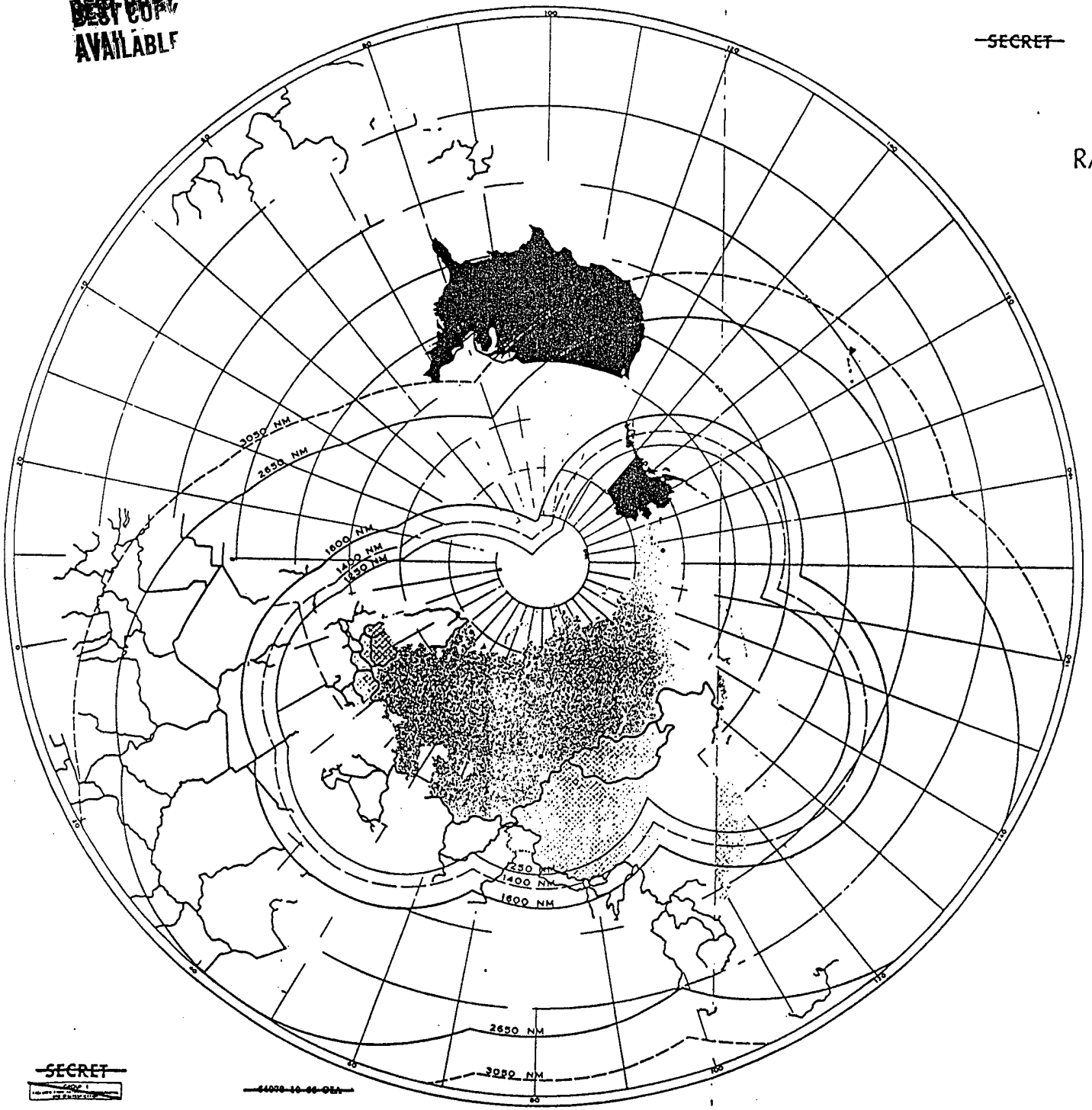

Soviet Bomber Capabilities against Northern Hemisphere

RADII/RANGES OF BLINDER

BLINDER A

Two-way unrefueled

——— 10,000 lb. bomb load 1250 NM

— — 3,300 lb. bomb load 1400 NM

One-way unrefueled

——— 10,000 lb. bomb load 2650 NM

– – – 3,300 lb. bomb load 3050 NM

BLINDER B

Two-way refueled

——— With ASM 1600 NM

Note 1: We believe BLINDER was designed for a supersonic-dash mission. Therefore, ranges shown, based on aircraft flying optimum mission profiles on direct routes, include a 200 NM dash at Mach 1.5 in the target area. If BLINDER were flown subsonic all the way, combat radius would be increased by some 450-500 NM. On the other hand, the effective range would be reduced by use of other bases, older model aircraft, standard mission profiles, indirect routes, low-level penetrations, or other tactics designed to delay or evade detection and interception.

NOTE 2: BLINDER A is a bomber not known to be equipped for in-flight refueling. The other version, BLINDER B, is equipped for in-flight refueling and ASM delivery; this weapon system could become operational in 1965.

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