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Soviet Strategic Air and Missile Defenses

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SOVIET STRATEGIC AIR AND MISSILE DEFENSES

THE PROBLEM

To estimate the strength and capabilities of Soviet strategic air and missile defense forces through mid-1969, and general trends in these forces through 1977.

CONCLUSIONS

A. We estimate that the Soviet strategic defense effort is larger, both in absolute terms and as a share of the total military budget, than that of the US. Resources allocated to strategic defense in the USSR are about equal to those devoted to strategic attack. This considerable defensive effort can be attributed primarily to the size and diversity of US strategic attack forces.

B. The Soviets have built a formidable system of air defenses, deployed in depth, which would be very effective under all weather conditions against subsonic and low-supersonic aircraft attempting to penetrate at medium and high altitudes. The system is less effective against higher performance aircraft and standoff weapons, and has generally no capability against low-altitude penetrations below about 1,000 feet.[1] The Soviets recognize these shortcomings and are deploying new interceptors, surface-to-air missiles (SAMs), and radars in an effort to improve their air defense capabilities.

C. Information received during the past year has strengthened our previous estimate that the mission of the Tallinn missile system is defense against the airborne threat, particularly against high performance aircraft and standoff weapons. It has been designated the SA-5. During 1967, the first SA-5 units probably became operational

[1] For the view of Rear Adm. E. B. Fluckey, the Assistant Chief of Naval Operations (Intelligence), Department of the Navy, see his footnote to the section on low-altitude capabilities, page 10.

and deployment was stepped up. We can now identify more than 40 complexes, which are being deployed in barrier defenses across likely avenues of attack and in point defense of key targets. The SA-5 system probably has capabilities against strategic ballistic missiles only in the limited self-defense role inherent in a high performance SAM system.[2]

D. Soviet planners undoubtedly recognize that US bombers and air-to-surface missiles (ASMs) will continue to present a major threat in the mid-1970's and have programed forces against them. We estimate that by the early 1970's the Soviets will have some 100-125 operational SA-5 complexes. They have begun to deploy a new long-range interceptor with better capabilities against the standoff threat and have developed a new airborne surveillance system, which could be used for warning and control. They are also developing interceptors with improved capabilities at low altitudes and may introduce a new SAM system for this type of defense. The primary limitation on low-altitude defense, however, is surveillance and control. We anticipate further Soviet development of ground-based radars and techniques specifically designed to handle low-altitude penetration in specific areas, but we expect little advance in ground-based continuous tracking capability at low altitudes for the USSR as a whole during the period of this estimate.

E. Construction of antiballistic missile (ABM) defenses around Moscow has continued during the past year, and we believe that they will become partially operational sometime in 1968. A full operational capability for the some 100 launchers apparently planned for the system will probably not be reached until 1971. Our analysis indicates that this ABM system will furnish a limited defense of the Moscow area, but that it has some apparent weaknesses. It does not cover all of the multidirectional US missile threat to Moscow; it is subject to saturation and exhaustion, and, in our judgment, none of the system components are hardened against nuclear bursts.

[2] Lt. Gen. Joseph F. Carroll, the Director, Defense Intelligence Agency, believes that the above statements carry a much higher degree of confidence in the judgments being rendered than are supported by the available evidence and that these statements do not adequately acknowledge the ABM possibilities of the Tallinn system. See his statement following the textual portion of the section on Missile Defense, page 20. For the views of Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army; Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF; and Rear Adm. E. B. Fluckey, the Assistant Chief of Naval Operations (Intelligence), Department of the Navy, on the mission and capabilities of the Tallinn system, see their statements following the textual portion of the section on Missile Defense, page 21.

F. We have no evidence of ABM deployment outside the Moscow area,[3] and it seems unlikely that the Soviets have yet decided upon a comprehensive system for national missile defense. We have no evidence of any wholly new ABM system in development, and think it more likely that the Soviets will develop an improved version of the Moscow system, which could probably begin to enter operational service as early as 1971-1972. We believe that when an improved system is available, the Soviets will fill out the Moscow defenses to cope more adequately with the US threat, and that they will extend their ABM defenses to other areas of the USSR.[4] The extent to which they undertake to do so will be affected by their consideration of economic and technological constraints.

G. During the past year several large Soviet radars which have very good capabilities for finding and tracking objects in space have begun partial operation; they will probably all be fully operational within the next 2 years. Although we have no evidence of a Soviet antisatellite weapons program, it would be technically possible for the Soviets now to have a limited capability against satellites in near earth orbit based on existing radars and missiles, employing nuclear warheads. Nonnuclear kill would require a ground-guided missile system of high precision or a homing missile capable of exoatmospheric maneuver, either of which could be developed in about 2 years after a decision to do so; such development could be well underway without our knowledge. Soviet ability to cope with satellites in higher orbits (above about 2,000 n.m.) appears very limited.[5] We believe that the Soviets would seek to destroy or neutralize US satellites only if they believed general war were imminent. They might, however, use antisatellite systems in peacetime if they believed they were retaliating against US interference with their own satellites.

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[3] Lt. Gen. Joseph F. Carroll, the Director, Defense Intelligence Agency, believes that the above statement carries a much higher degree of confidence in the judgments being rendered than is supported by the available evidence and that this statement does not adequately acknowledge the ABM possibilities of the Tallinn system. See his statement following the textual portion of the section on Missile Defense, page 20. For the views of Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army, and Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, on the mission and capabilities of the Tallinn system, see their statements following the textual portion of the section on Missile Defense, page 21.

[4] For the view of Rear Adm. E. B. Fluckey, the Assistant Chief of Naval Operations (Intelligence), Department of the Navy, on the mission and capabilities of the Tallinn system, see his statement following the textual portion of the section on Missile Defense, page 21.

[5] For the view of Rear Adm. E. B. Fluckey, the Assistant Chief of Naval Operations (Intelligence), Department of the Navy, see his footnote to the second sentence of paragraph 60.

DISCUSSION

I. SOVIET STRATEGIC DEFENSE FORCES*

1. We estimate that the Soviet strategic defense effort is larger, both in absolute terms, and as a share of the total military budget, than that of the US. The Soviets allocate about equal resources to their strategic attack and their strategic defense forces. This considerable effort can be attributed primarily to the size and diversity of US strategic attack forces.

2. The development of Soviet strategic defense forces since World War II has gone through several stages of reaction to the changing US threat. Through the mid-1950's the Soviets attempted to counter the large US strategic bomber force in being with large numbers of air surveillance radars and interceptor aircraft, reinforced at Moscow with large numbers of surface-to-air missiles (SAMs). As the US force obtained higher performance intercontinental bombers, the Soviets in the late 1950's developed and deployed Mach 2 interceptors and extended SAM defenses throughout the country. When the US, in the face of this extensive defense, began practicing low-altitude penetration tactics, the Soviets began in the early 1960's deploying the Firebar interceptor and the SA-3, both possessing better capabilities for low-altitude intercept than earlier systems. The US development of a standoff capability with air-to-surface missiles (ASMs), was followed by Soviet development and the current deployment of the Fiddler interceptor and the Tallinn defensive system, which have greater ranges than earlier systems.

3. In their efforts to have a defense in being against an immediate threat, the Soviets have generally deployed a system quite early, using available technology, rather than wait for the development of more advanced but unproven techniques. These systems have then generally been modified and improved during the period of deployment. In some cases, however, deployment has been canceled early in the program, either because the system proved relatively ineffective or because a better one was in the offing. When an improved system has been deployed, older ones are not rapidly retired or replaced. The Soviets tend to have extensive defenses deployed in depth, usually with considerable redundancy. This redundancy often gives the defenses as a whole a greater capability than analysis of each weapons system alone would indicate. On the other hand, some elements of the defenses are always somewhat out of date, and do not represent the most effective Soviet counter to new US systems or concepts of operation.

4. Soviet military planners probably see the US strategic threat in the mid-1970's as consisting of three major forces: bombers and ASMs, intercontinental

* See also the most recent estimate on general Soviet military policy, NIE 11-4-67, "Main Trends in Soviet Military Policy," dated 27 July 1967, SECRET.

ballistic missiles (ICBMs), and submarine-launched ballistic missiles (SLBMs). They are aware that the threat will become vastly more sophisticated and formidable with the incorporation of programed improvements—penetration aids, multiple independently-targeted reentry vehicles (MIRVs), and new aircraft and ASMs. They probably believe that the massive air defense forces they have built and are building will provide an effective counter to the medium and high altitude bomber threat, although they realize the problem of low-altitude defense is not yet satisfactorily solved. The most critical requirement of Soviet strategic defense, and the one most difficult to meet despite more than a decade of effort, is defense against US ballistic missiles. The Soviets are deploying antiballistic missile (ABM) defenses around Moscow. We continue to have no evidence of ABM deployment elsewhere in the USSR.[1] Further ABM deployment, its nature and extent, is almost certainly one of the major questions of Soviet military policy.

5. Soviet decisions as to how best to meet the strategic threat of the mid-1970's will be affected not only by the Soviet view of the threat and the pace of technological development, but also by the constraints of economics. The Soviet leadership has shown a general disposition to accommodate military programs, and military expenditures are clearly rising. Nevertheless, the Soviet leaders will continue to face difficult choices in allocating resources among a variety of competing claimants, both civilian and military. Their decisions as to whether, and to what extent, to extend ABM deployment—potentially the most costly single military program on the horizon—must be made in the context of these competing claimants.

6. Soviet strategic defense is the responsibility of the PVO Strany (Antiair Defense of the Country), whose commander in chief is a Deputy Minister of Defense ranking with the heads of the naval, air, and strategic missile forces. The Soviets have stated that the destruction of aerodynamic, ballistic, and space targets in flight will be performed by the PVO Strany. We have no knowledge of the way in which the antimissile and antisatellite functions are organized in PVO.

II. AIR DEFENSE

7. The PVO air defense is composed of three major force elements, performing the functions of air surveillance, interceptor, and SAM operations. These forces

[1] Lt. Gen. Joseph F. Carroll, the Director, Defense Intelligence Agency, believes that the above statement carries a much higher degree of confidence in the judgments being rendered than is supported by the available evidence and that this statement does not adequately acknowledge the ABM possibilities of the Tallinn system. See his statement on the mission and capabilities of the Tallinn system following the textual portion of the section on Missile Defense, page 20. For the views of Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army, and Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, on the mission and capabilities of the Tallinn system, see their statements following the textual portion of the section on Missile Defense, page 21.

are deployed throughout the USSR in a hierarchy of geographical divisions and subdivisions linked by multiple communications channels. The major divisions are 10 air defense districts (ADDs), which are, in turn, divided into some 40 air defense zones (ADZs). Most of the latter are further divided into sectors for air surveillance purposes. Integrated control over all three functional elements of the air defense forces is exercised primarily at the ADZ level.

8. In addition to the forces directly assigned to it, the PVO Strany can call on the services of the air defense elements of the Soviet general purpose forces. Moreover, each of the Eastern European countries of the Warsaw Pact has a separate national system equipped almost exclusively with Soviet materiel and organized in much the same manner as an ADD. For all practical purposes these systems constitute an extension of the Soviet system. We believe that during the past several years the USSR has assisted the People's Republic of Mongolia in setting up an air defense system, and that it is closely coordinated with the PVO. Although the Soviet and Chinese Communist air surveillance authorities still maintain contact, cooperation between them is minimal.

A. Forces Through Mid-1969

Air Surveillance

9. Soviet air defenses are based on some 1,000 operational radar sites, distributed along the boundaries of the country, along barriers within the country, and around major defended areas. These are supplemented by some 300 sites in the Eastern European countries of the Warsaw Pact. Each of these sites has a multiplicity of radars. All have several air surveillance radars; practically all also have radars which can provide information to ground-controlled intercept (GCI) controllers. We believe that the density of coverage increases the likelihood of detection, and frequency diversification among the sets provides some defense against electronic countermeasures (ECM). We expect the numbers of radar sites to remain relatively stable in the near term.

10. Air situation information from the radar sites is reported to filter centers and control centers over a communications network which has a high degree of redundancy, flexibility, and reliability. We estimate that the Soviets continue to use older high frequency (HF) radio and open wire communications systems, but they probably are superimposing newer high capacity cable and microwave systems, which by 1969 may account for a major part of circuit capacity. We believe that they are also building a troposcatter system in the northern part of the USSR which will probably be used by PVO and will be operational by mid-1969. In addition, PVO will probably use communications satellites in the near future, if they are not doing so already.

11. During the last decade the Soviets have been gradually introducing a semiautomatic data transmission system into their air surveillance network, which, we believe, will increase the speed and volume of data handling. We estimate that this system is now used extensively in about one-third of the ADZs in the

USSR, by Soviet theater forces in East Europe, and by the national air defense systems of several East European members of the Warsaw Pact. Conventional systems are still employed in large measure in all areas. We believe that with the introduction of semiautomatic data reporting, centralized control in the ADZ is improved, leading to less delay and more efficient operations. The continuing improvement of PVO communications is directed primarily toward improving timeliness and reducing the possibility of saturation of the air surveillance and control system.

Interceptors

12. We estimate that, as of October 1967, there were about 3,470 interceptors in Fighter Aviation of Air Defense (IAPVO)—some 100 less than last year. In addition, approximately 2,500 fighters of Soviet Tactical Aviation are available as an auxiliary force for strategic air defense if required, as are an equal number of fighters in the air forces of the European Communist countries of the Warsaw Pact. Nearly all of these 5,000 fighters in Tactical Aviation and the East European Warsaw Pact air forces were designed as interceptors; some 3,200 of them are in regiments which have a primary role of air defense.

13. About two-thirds of the Soviet interceptor force in IAPVO is still made up of subsonic or low supersonic models introduced in 1957 or earlier, which have little capability above 50,000 feet.[8] Most of these models are day fighters and are armed with guns or rockets limiting them to attack ranges of a half-mile or less. Most of the other third of the force is composed of Mach 2 all-weather interceptors introduced in 1959-1964, which are armed with air-to-air missiles (AAMs) having ranges of 3-6 n.m. New deployment of the models characterized above has ceased. Some of the Mach 2 models have been retrofited with improved armament.

14. A new generation of aircraft started to enter operational units in 1964, and is currently being deployed. The deployment in 1964 of the low-altitude interceptor Firebar, using AAMs with a range of 10-12 n.m., started this series of improved Mach 2 fighters. Firebar was followed in late 1966 by the deployment of the long-range interceptor Fiddler with a combat radius of up to about 1,000 n.m. We estimate that Fiddler is the first Soviet all-weather interceptor capable of attacking from any direction and that it will have all-weather missiles with an effective range of up to 16 n.m. We believe that Fiddler has a semiautomatic data link control, allowing it to be directed from the ground until it is within firing range of the target. The latest Soviet interceptor, the Flagon A, was first deployed in late 1967; its speed of about Mach 2.5, AAM range of 10-12 n.m., and combat ceiling of 65,000 feet indicate that it will probably supersede the Fishpot as the primary Soviet high-altitude point interceptor. We believe

[8] See Table I at Annex for characteristics and capabilities of Soviet interceptors.

the Flagon A will be equipped with a fully automatic system, allowing the aircraft to be controlled from the ground.

15. We estimate that models currently being deployed will continue to enter the IAPVO forces over the next few years, and that older models will be phased out, as indicated below. These older models may be retained as reserve aircraft.

ESTIMATED INTERCEPTOR FORCE LEVELS

	October 1967	Mid-1968	Mid-1969
Models No Longer Being Produced			
Fresco (Mig-17)	1,550	1,375–1,425	1,200–1,250
Farmer (Mig-19)	550	450–475	400–425
Flashlight (Yak-25)	160	125–150	75–100
Fitter (SU-7)	20	0–20	0
Fishpot (SU-9)	780	750–800	750–800
Models Currently Being Produced			
Firebar (Yak-28)	360	400–425	400–425
Fiddler (TU-?)	40	50–80	75–125
Flagon A (SU-?)	10	25–50	100–150
TOTAL	3,470	3,175–3,425	3,000–3,275

Surface-to-Air Missiles

16. The area defense capabilities of the IAPVO are supplemented in the USSR by the widespread deployment of the SA-2 SAM which makes up the great bulk of Soviet SAM defenses.[9] Deployment of the SA-2 was essentially complete by the end of 1965. We estimate that there are some 870 sites of six launchers each in the USSR occupied by operational SA-2 battalions, and that there are also about 160 sites which are not permanently occupied and are probably intended to provide alternate or supplementary positions during periods of emergency. In addition, there are some 130 SA-2 sites in the Eastern European countries of the Warsaw Pact, and an estimated 60-80 SA-2 battalions in the ground forces. Since its initial deployment, the SA-2 has undergone several model changes, which have progressively increased its maximum effective range from 19 to about 27 n.m., improved its maximum and minimum intercept altitude capabilities, and given it better tracking and electronic counter-countermeasure (ECCM) capabilities.[10]

17. The low-altitude SA-3 system is now deployed in some 115 SA-3 sites around Moscow, Leningrad, and on some border approaches. We estimate that about 80 percent of the sites are permanently occupied. Further deployment

[9] See Table II at Annex for characteristics and capabilities of Soviet SAMs.

[10] The latest model is used almost exclusively in the USSR; the earlier model now used in North Vietnam has been almost entirely retired from service in the USSR.

ceased about 1965.[11] The SA-1 system, deployed more than a decade ago in a double ring around Moscow, is still operational, although only about one-fifth of the 3,280 launchers are maintained in a state of readiness. We believe the Soviets have made improvements in this system which give it a capability against high performance aircraft approaching that of the SA-2. We expect no appreciable change in the force levels in the USSR of the SA-1, SA-2, or SA-3 through 1969.

18. *Tallinn System.*[12] [13] On the basis of information obtained during the past year we can now estimate with high confidence that the Tallinn defensive missile system has significant capabilities against high-speed aerodynamic vehicles flying at medium and high altitude, and that its mission is defense against the airborne threat. We have designated the system the SA-5. We believe that the engagement radar at each site probably is a development from earlier Soviet SAM guidance radars, and that the missile was designed to operate within the atmosphere.

19. We believe that deployment of the SA-5 has stepped up in the past year, and that there are now more than 40 complexes, twice the number of a year ago. It is apparently still being deployed in a barrier defense around the European USSR and for point defense of selected targets. We believe several complexes are now operational. Construction to date suggests that some 50 complexes will be in operation by mid-1969.

B. Capabilities Through Mid-1969

Against the Medium- and High-Altitude Threat

20. Soviet air defenses have a formidable capability against subsonic and low-supersonic (less than Mach 1.5) aircraft attempting to penetrate at medium and high altitudes to principal target areas under all weather conditions. Under optimum conditions, the range at which the Soviet early warning (EW) system can detect and track is limited only by the radar horizon, and extends up to 200-250 n.m. from Soviet borders. Detection and tracking at medium or high altitudes is virtually assured at about 135 n.m. The detection range of the EW system is progressively reduced against aircraft penetrating at lower altitudes, primarily because of line-of-sight range limitations.

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[11] Construction of positions that may be used for SA-3 deployment has recently been detected in East Germany; however, we have not firmly identified SA-3 equipment outside the USSR.

[12] The possible development of the Tallinn system for use in an ABM role is discussed in paragraph 50.

[13] For the views of Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army, and Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, on the mission and capabilities of the Tallinn system, see their statements following the textual portion of the section on Missile Defense, page 21.

21. The Soviet interceptor force has good capabilities against subsonic and low-supersonic aircraft at altitudes from 3,000 to 65,000 feet. Its capabilities are degraded at night or in adverse weather conditions, by attacks at lower altitudes, by standoff attacks, and by attacks using decoys and ECM. Against maneuvering supersonic targets flying at speeds of over Mach 1.5 and at altitudes above 65,000 feet, the Soviet manned intercept capability is probably marginal. The recently initiated deployment of the Flagon A, with rapid climb capabilities, and a probable automated control system will greatly improve high-altitude capabilities. The probable shoot-up capability of the AAM on the Fiddler will also contribute to improving the high-altitude, high-speed capability of Soviet air defenses.

22. Soviet SAM systems provide good medium- and high-altitude defense against aircraft under all weather conditions. However, the earlier SAMs—SA-1, SA-2, and SA-3—are short-range systems and are considerably less effective against small, high-speed ASMs. We believe that the SA-1 may already have a nuclear capability, and that the SA-2 may soon have one, if it does not already. Selective addition of a nuclear capability to the SA-2 would greatly increase its kill probability.

23. The SA-5 (Tallinn) system represents a considerable improvement over these older systems in terms of range, velocity, and firepower, which combine to provide a much higher probability of kill. We estimate that it is capable of engaging aircraft and ASMs traveling at speeds of up to about Mach 3 and at altitudes of up to about 100,000 feet. Its maximum range is probably about 75 n.m., but would vary with target speed and altitude. Considering its range, we believe the system would use a conventional warhead with homing guidance, or a nuclear warhead with or without homing guidance.

Against the Low-Altitude Threat[14]

24. The capabilities of Soviet air defenses to intercept aircraft or ASMs flying at low altitudes decline with the altitude, largely because of ground clutter and the line-of-sight limitations of the radars. The approaches to the major military-industrial centers have dense radar coverage. In these areas of dense coverage the air surveillance network probably is capable of maintaining a continuous track on aircraft flying as low as 1,000 feet; in practice, however, the capability depends largely on the training and alertness of individual radar operators, and on weather, terrain, and other factors. In areas of less dense coverage, Soviet radars are unlikely to be able to accomplish continuous tracking below 3,000 feet. The Soviets have virtually no continuous tracking capability below 1,000

[14] Rear Adm. E. B. Fluckey, the Assistant Chief of Naval Operations (Intelligence), Department of the Navy, believes that this section conveys the impression that low-altitude penetration of Soviet air space could be accomplished with relative impunity. He believes that this is not the case, that the total weight of Soviet air defense—missiles, manned interceptors, antiaircraft artillery, and associated fire control systems—provides a better capability against low-altitude penetration than is indicated in the text, particularly in good weather and in some sea approaches.

feet, except where installations, utilizing new radars on masts, indicate a tracking capability down to 500 feet.

25. The Firebar interceptor, which can operate at night or in adverse weather conditions, probably has a capability down to about 1,000 feet over land and somewhat lower over water. The ability to intercept at these altitudes would depend on the proficiency and experience of the ground controller and the pilot. We believe the Soviets have during the past year made some marginal improvements in the radar employed by the Fishpot "C" and Firebar, giving them some capability to distinguish moving targets against ground clutter, but no significant improvement in low-altitude capability. In clear daylight the older model interceptors, still operational in large numbers, could also be used for low-altitude area intercept under visual conditions.

26. The SA-3 system was deployed at some locations on the periphery of the USSR and around Moscow and Leningrad to furnish an all-weather intercept capability down to an estimated 1,000 feet within its limited circle of fire. An improved SA-2, with twice the range of the SA-3 and deployed more widely, probably has a capability down to about 1,500 feet. Evidence to date does not allow us confidently to assess the low-altitude capability of the SA-5, but we believe it is not better than that of earlier SAM systems; its current deployment is not indicative of a low-altitude SAM system.

27. Antiaircraft artillery (AAA) is widely employed for low-altitude defense by Soviet theater field forces, but is no longer deployed in PVO for defense of fixed strategic targets.

Against the Standoff Threat

28. We believe that the capability of older Soviet interceptor and SAM systems is degraded by the standoff threat. The SA-5 and the Fiddler however, were probably designed to cope with this threat.[12] As noted above, the SA-5 represents a considerable improvement over older systems in range, altitude, and kill probability but not, we believe, in low-altitude capability. It probably has a much improved capability against small, high-speed ASMs and aircraft flying at Mach 2-3.

29. The Fiddler has a combat radius, armament, and attack range approximately double those of previous Soviet interceptors, making possible repeated attacks on aircraft before they can launch their ASMs. To be effective in this role, however, the Fiddler will need a surveillance and control system that will extend further to sea from the Soviet border than present systems. Although the USSR has some radar picket ships, these are limited in number and capability. We believe, however, that the Soviets have developed a new airborne surveil-

[12] For the views of Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army, and Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, on the mission and capabilities of the Tallinn system, see their statements following the textual portion of the section on Missile Defense, page 21.

lance radar system, probably using the TU-114 (Cleat). If adopted for airborne warning and control, such a system could improve the Soviet EW capability, particularly against low-level penetrations over sea approaches, and could provide the airborne control required for long-range intercepts.

Against an Electronic Countermeasure Environment

30. The use of ECM appreciably degrades the performance of air defenses. However, the Soviets practice a great deal in an ECM environment in order to perfect the operation of air defense systems. Furthermore, the new interceptors now being deployed are equipped with infrared missiles and data links for GCI, which improve their capability in an ECM environment. All Soviet SAM systems are designed to operate in a noise jamming environment, and the SA-2 model deployed widely in the USSR can probably counter angle deception jamming and select moving targets in an ECM environment; this model is being introduced in Eastern Europe, but not in Vietnam. Considering Soviet emphasis upon overcoming ECM, we would expect the SA-5 to be given features enhancing its ability to operate in the presence of ECM.

C. Capabilities Through Mid-1977

31. We believe that the Soviet air defense system will still have a requirement in the 1970's for adequate defenses below 1,000 feet, and that major efforts will be exerted in an attempt to meet this requirement. One limitation on an adequate low-altitude capability is the Soviet reliance on close GCI control, which would require many closely spaced ground radars, even when elevated. The Soviets appear to be trying out such an approach with the development of a new small radar having an elevated antenna. Another approach to the problem could be the use of an over-the-horizon detection (OHD) radar system, but we have no evidence of a Soviet OHD system for detection of aircraft, and we cannot tell when or even if the Soviets could develop a sufficiently reliable system to warrant deployment. Although we anticipate further Soviet development of radars and techniques specifically designed to handle low-altitude penetration in specific areas, we expect little advance in ground-based continuous tracking capability at low altitude for the USSR as a whole during the period of this estimate.

32. Interceptors with a low-altitude capability require some technique of clutter rejection on their air intercept (AI) radars, such as a moving target indicator (MTI). During the past few years new interceptors with a limited MTI capability have appeared, and we believe that improved fire control radars giving better low-altitude capability will be installed on interceptors in the early 1970's. The first such interceptor may be the Foxbat, a new Mikoyan design, which could be operational in IAPVO by 1970-1971. It would probably also have AAM systems with clutter rejection, enabling them to shoot down toward the ground, as well as automatic data link control.

33. The Soviets probably see the requirement for long-range interceptors as extending into the 1970's. They may develop an advanced all-weather Mach 3

cruise interceptor with the range of the Fiddler and a look-down, shoot-down capability. It could be available in 1974-1976.

34. Improvements to the low-altitude capabilities of SA-2 and SA-3 have probably approached the limits of these systems; the SA-5 probably has no better capability in this respect at present. To further improve low-altitude SAM capabilities, the Soviets would have to develop a new system specifically tailored to this purpose, and deploy it widely. We have no evidence of the development of a new system optimized for low-altitude defense, and would not expect such a system to be operational before about 1971. A purely low-altitude system would probably be deployed only in defense of relatively limited areas; its short range would make deployment for continuous effective defense extremely expensive. Instead of developing a purely low-altitude SAM system, therefore, the Soviets may elect to develop a follow-on SAM system for the SA-2 and SA-3, incorporating some of the more advanced concepts such as phased-array radars coupled with infrared and coherent radar homing systems. Such a system might include a low-medium altitude intercept capability against high performance aerodynamic vehicles at longer ranges than a system designed purely for low-altitude intercept. It would be used to replace the SA-2 and SA-3 systems and to complement the SA-5 system; it could be ready for deployment in the mid-1970's.

35. The continued introduction of higher performance interceptors and SAMs, together with the rapid data transmission requirements of low-altitude intercept, will impose increasing burdens on Soviet air defense communications and control. We believe that the Soviets will meet their challenge by extending their semiautomatic data system to all ADZs, and making it available to SAM controllers as well as GCI controllers. They will probably also improve the capacity of communications systems through multichannel cable and microwave systems using multiplexing techniques, and through greater use of troposcatter and satellite communications systems. We believe that the trend toward more rapid data assimilation and transmission will continue to be paralleled by concentration of control at the ADZ level. The greater ranges of new intercept systems may lead to the combining of some zones.

36. As the newer fighters continue to enter the interceptor force, we believe that a control system sufficiently sophisticated to allow a degree of "hands off" computerized control will be deployed on the Flagon A and later interceptors and will be the basis for a second generation fighter control environment in the USSR. Such a system would permit these interceptors to operate in a controlled environment, allowing close coordination of interceptor and SAM operations.

D. Forces Through Mid-1977

37. Although the capability of new air defense radars will increase, the need for low-altitude coverage will continue to require much overlapping, and the

number of radar sites will probably decline only slightly. As new radars with greater reliability and frequency diversification are introduced, however, the need for redundancy at each site will decline. Older radars will probably be phased out faster than newer ones introduced, and the numbers of radars will gradually decrease over the next decade.

38. Largely to offset the lack of high performance interceptors, the Soviets in the past have kept large numbers of the older models in service longer than we expected. However, now that new interceptors are being deployed in increasing numbers, the need for extremely large numbers of aircraft for strategic defense will diminish. The overall capability of the interceptor force will probably improve significantly during the next decade even though there is a decline in the number of aircraft. We estimate that the numbers of interceptors in IAPVO will decline to about three-fourths of the present level by 1972, and to about two-thirds the present level by 1977. The trend in the force level will depend largely on the rate at which the Soviets phase out the aircraft over 15 years old.

39. We believe that the Soviets will continue to deploy the SA-5 so as to provide forward defenses on the likely approaches to the industrial heartland of the European USSR, and a local defense of key targets and selected major cities throughout the USSR. Based on this deployment concept, the distance separating existing adjacent complexes, and the rate of starts over the past year, we now estimate that 100-125 SA-5 complexes will be operational by about 1972. Deployment may be extended to another 50 or so complexes by 1975. Starting in the 1970's, the Soviets will probably phase out the SA-1 as additional SA-5 complexes are built around Moscow. We would expect that deployment levels of SA-2 would be reduced somewhat in those areas covered by the SA-5 system.[16] We do not believe that the system will be phased out during the period of this estimate. If the Soviets should deploy a new system with improved low-altitude capabilities, numbers of SA-2 would probably decline further, and the SA-3 would be phased out.

III. MISSILE DEFENSE[17]

40. For the past decade the Soviets have carried on an extensive, varied, and costly R&D program to create defenses against ballistic missiles. They have developed radars to detect and track ballistic missiles[redacted] They have tried various ABM techniques, interceptor missiles, and concepts of system integration. Early suc-

[16] Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army, does not believe that this sentence is correct since SA-2 sites have been later constructed at at least one Tallinn complex.

[17] For the views of Lt. Gen. Joseph F. Carroll, the Director, Defense Intelligence Agency; Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army; Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF; and Rear Adm. E. B. Fluckey, the Assistant Chief of Naval Operations (Intelligence), Department of the Navy, on the mission and capabilities of the Tallinn system, see their statements following the textual portion of this section on Missile Defense, pages 20 and 21.

cesses in solving some of the technical problems of ABM defense apparently led the Soviets to start deployment of a prototype system at Moscow in 1962, before the system had been tested. We have detected no ABM deployment elsewhere in the USSR in the past 5 years.[17] The apparent decision not to deploy further probably reflects Soviet concern for the economic and technological problems in countering the developing US ballistic missile threat.

A. Forces and Capabilities Through Mid-1969: The Moscow System

41. Early warning, identification, and initial tracking for the Moscow system is probably to be provided by large phased-array dual Hen House radars at Olenegorsk on the Kola Peninsula and at Skrunda in Latvia.[18] [ ] they will probably soon become fully operational. The capabilities, location, and orientation of these radars indicate that their primary concerns are ICBMs launched from the US toward targets in Western USSR; some limited Polaris missile coverage is also obtained. We have located no radars which could provide coverage against ICBMs launched toward central and eastern USSR and against the full Polaris threat.

42. These Hen House radars incorporate features which provide them with an excellent capability for detecting and tracking reentry vehicles (RVs)[

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43. We believe that long-range acquisition, early target tracking, and target sorting are to be provided by another large phased-array radar (which we call Dog House), located about 35 n.m. southwest of Moscow.[19] The large size and physical configuration of the Dog House lead us to believe that it will have a tracking capability and a target handling capacity somewhat greater than the Hen House. The northwestern face of the Dog House now appears to be complete.

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[17] For the views of Lt. Gen. Joseph F. Carroll, the Director, Defense Intelligence Agency; Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army; Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF; and Rear Adm. E. B. Fluckey, the Assistant Chief of Naval Operations (Intelligence), Department of the Navy, on the mission and capabilities of the Tallinn system, see their statements following the textual portion of this section on Missile Defense, pages 20 and 21.

[18] These radars also contribute to the general space surveillance mission discussed in section IV.

[19] See Table III at Annex for estimated characteristics and performance of the Moscow ABM system.

44. The other major components of the Moscow system include the terminal target tracking and missile guidance radar installations called Triads, and probable launch positions for the Galosh interceptor missile; two Triads and associated launch positions are located at several SA-1 sites on the outer ring about 45 n.m. from the center of Moscow. Construction of these components has continued at a moderate pace during the past year. Although we have not detected operation of the Dog House or of a Triad radar, we believe that the system will become partially operational sometime in 1968. We believe that the deployment now planned, with several Triads and about 100 launchers, will probably not become fully operational until 1971.

45. We believe that the Moscow ABM defenses are intended to intercept incoming missiles at slant ranges out to about 300 n.m. from the launch positions.[20] [

46. The small number of interceptors apparently to be employed by the system and its estimated intercept altitude suggest that each warhead is expected to have a large lethal radius in order to be useful against dispersed target threats outside the atmosphere. On the other hand the high accuracy of the Hen House, that will probably be duplicated by the Dog House, and the apparent great precision of the Triad radars indicate a capability for precise target tracking and interceptor guidance, more compatible with a system that does not rely on a large volume kill mechanism.

47. We believe the chances are about even that the Galosh missile has a specially constructed nuclear warhead with a kill capability on the order of 25-100 n.m., depending on the specific RV involved. On the other hand, if the Galosh did not have such a specially constructed nuclear warhead, it would probably be able to destroy the incoming RV only at distances on the order of 5-10 n.m.

48. This analysis of the Moscow ABM system indicates that, as presently deployed, it will furnish a limited defense of the Moscow area, but that it has some apparent weaknesses. Apparent limitations on the Triad tracking and guidance radars and on the numbers of launchers indicate that the system is subject to saturation and exhaustion. The launchers probably have a reload

[20] Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army, believes that [analysis of system capabilities give capacity for greater range. [ ]

capability; we estimate that reload would require on the order of 30 minutes. Its capability to deal with penetration aids and precursor bursts is probably not high. The Triads probably have some ability to function autonomously if the Hen House and Dog House are lost, but they probably would not be able to handle a very large threat. The present deployment of Hen House and Dog House does not cover all of the multidirectional Polaris threat to Moscow; in particular, the northern Hen Houses are blind to Polaris attack from the rear. Finally, none of the system components appear to be hardened to withstand the effects of nuclear bursts; the Hen Houses are particularly vulnerable.

B. Forces and Capabilities Through Mid-1977

System Development

49. We cannot identify any wholly new ABM system in development, but in view of the estimated limited capabilities of the Moscow ABM defenses, we believe the Soviets will devote substantial efforts to upgrading their present hardware and exploring new system concepts. Continued development of the Galosh and new large radars at Sary Shagan could lead to an improved variant of the Moscow system. Such a system could probably be operational starting as early as 1971-1972. We think that the Soviets are more likely to improve the Moscow system than to develop a wholly new long-range system.

50. We believe that the Tallinn system was designed and deployed as a SAM system, although it probably has the limited self-defense capability against strategic ballistic missiles that is inherent in a high performance SAM system. We think it unlikely that it will be developed into a strategic ABM system. Such a development would require acquisition inputs from other systems, a new fire control system and radar, and a new missile.[21]

51. We have no evidence that the Soviets are developing an ABM system that utilizes atmospheric discrimination. We believe, however, that US programs for penetration aids and advanced warheads will cause them to reassess their ABM program, and that as a consequence they may develop a short-range, high-acceleration missile. The estimated acceleration of the Galosh precludes its use in such a role. The time needed to develop and deploy such a system indicates that IOC probably could not be before 1973-1974. We would probably learn of and identify such development and deployment at least 2 years before IOC.

52. We expect the Soviets to continue their efforts to develop improved detection and tracking systems. There is no direct evidence that the Soviets have tested ABM components against penetration aids. Although the Hen House

[21] For the views of Lt. Gen. Joseph F. Carroll, the Director, Defense Intelligence Agency; Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army; and Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, on the mission and capabilities of the Tallinn system, see their statements following the textual portion of this section, pages 20 and 21.

may have a greater capability than we estimated last year, we expect additional R&D beyond that undertaken by the present Hen House in an attempt to counter US programed capabilities.

53. The Soviets have been investigating OTH techniques, possibly for missile EW, [redacted] We believe that their level of technology is such that they may be able to detect ballistic missile launches out to about 2,000 n.m. We have no evidence now of an operational OTH system for detection of missile launches, and we cannot tell when or even if the Soviets could develop a sufficiently reliable system to warrant deployment. The Soviets may now also be developing space-borne systems (such as infrared launch detection sensors) which could be used in support of their strategic defense forces.

ABM Deployment

54. We believe that ABM deployment is the subject of continuing debate within the Soviet military and political leadership. There are undoubtedly those who advocate primary reliance on strategic attack forces for damage-limiting and oppose further expansion of missile defenses, those who wish to wait until a more effective system is developed, and those who wish to immediately extend deployment of systems presently available. There may also be those who have concluded that an effective defense against the US missile threat is precluded on technological and economic grounds and that the USSR should seriously consider strategic arms control. Our evidence does not indicate what decisions have or have not been made, but on balance we believe that when problems of systems effectiveness are solved to their satisfaction, the Soviets will extend their ABM defenses to other areas of the USSR.[=] We base this belief largely on the traditionally great Soviet concern with strategic defense and on the general disposition of the present leadership to accommodate military programs.

55. We believe the most likely first step in further ABM deployment would be the filling out of the existing Moscow defenses with additional launch positions and forward radars so that they can cope more adequately with the entire US missile threat. In considering the goals of an ABM program beyond Moscow,

[=] Rear Adm. E. B. Fluckey, the Assistant Chief of Naval Operations (Intelligence), Department of the Navy, believes that the Galosh system could be a part of a Soviet retaliatory assured destruction defensive weapons system. Moscow, at the hub of all defense and counter strike and the center of command and control, must avoid destruction long enough to provide time for decision, retaliation, damage assessment of the Soviet Union, and rapid communications with the outside world. Should the US strike first, the Soviets would have only about 10 minutes tactical warning, compared to our own short 15 minutes if the Soviets strike first. They may consider this reaction time insufficient and so are willing to expend substantial funds to cover Moscow with an ABM system to gain as much as 24 hours grace before fallout moving in from other attack areas would degrade their capability to decide and respond. Having attained this, they might decide that ABM defenses for the comprehensive defense of the USSR are too costly.

the Soviets will, of course, consider the feasibility of extensive deployment of ABM systems for the general defense of the Soviet Union. The extent to which they undertake to deploy will be affected by their consideration of economic and technological restraints.

56. Such considerations may cause the Soviets to settle for a less comprehensive deployment that would provide protection, against a US threat, for major population centers and some significant portion of their strategic forces.. The Soviets may also consider that an ABM defense which would limit the damage that could be done by a third country, and be sufficient to deter the US through defense of Soviet strategic retaliatory ICBMs, would be an acceptable and feasible level of defense. This extension of area defenses could begin to be operational about 1972.[a] Supplementation of this force with a short-range terminal defense system to defend the forward radars, the complexes of ICBM silos, and specific urban areas protected by the long-range ABM defenses would be possible starting about 1974. Deployment, even if started then, would probably continue beyond 1977.

[a] For the views of Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army, and Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, on the mission and capabilities of the Tallinn system, see their statements following the textual portion of this section, page 21.

DIA Position on the Tallinn System

Lt. Gen. Joseph F. Carroll, the Director, Defense Intelligence Agency, believes that the above statements on the Tallinn system convey a much higher degree of confidence in the judgments being rendered than are supported by the available evidence; and that these statements do not adequately portray the ABM possibilities of the Tallinn system. He believes that on the basis of information obtained over the past year, the Tallinn system, throughout its deployment, will consist of: the Tallinn complexes, usually 3 or 5 sites, 6 launchers at each site; an engagement radar for each 6 launchers: air defense radars for early warning, and acquisition; and supporting command and control.

In this configuration he believes, with high confidence, that the system has the mission to defend against the aerodynamic threat and that it can engage aerodynamic vehicles at altitudes up to about 120,000 feet and at speeds of Mach 2 to 3. At medium and high altitudes the flyout range would be about 70-80 n.m. At low altitudes the flyout range would be about 30-40 n.m. He agrees that the Tallinn system deployment is not indicative of a low altitude SAM and that its low altitude capabilities are probably no better than those of the SA-2.

However, recognizing the uncertainties, he considers that this system, if equipped with appropriate ABM nuclear warheads and appropriate computers and fire control, would have a local and self-defense capability against ICBMs. (Local and self-defense is defined as a capability to defend against present US reentry vehicles targeted either against the Tallinn sites or to points within a radius up to 20 n.m. from the site.)

Further, if the Tallinn system described above were additionally provided radar data from long range acquisition and target tracking radars such as HEN HOUSE and DOG HOUSE, a centralized command and control system and necessary links to the complexes, then the system would have a limited ABM area defense capability, but only at about 30 of the presently observed complexes; and at this time only against attacks from the north and northwest. Based on an assessment of the flyout characteristics of the missile, as now understood, the altitude capability would be limited to a maximum of about 100-110 n.m. at ranges of about 75 n.m. from the sites, and to about 50 n.m. at ranges of about 150 n.m. The system effectiveness would be dependent on several factors such as warhead characteristics, radar performance and missile performance.

If such an ABM capability did exist and the long range radars were destroyed or denied, the capability of the Tallinn complexes would be reduced to that of a SAM against aerodynamic vehicles, and at most to local and self-defense against ICBMs.

He notes the deployment of long range acquisition and tracking radars at Olenegorsk, Skrunda and at Moscow, and that a command and control system to use the data from these radars is essential to the GALOSH/Moscow system. He also notes that no additional long range radars have been detected in deployment and that the Tallinn missile, as presently assessed, does not seem to be optimized for an ABM role.

He believes that, despite the different and additional information that has been obtained over the past year on the Tallinn system, there remain significant areas of uncertainty, especially concerning the development objectives and operational concept for the system and performance capabilities of important components. He believes that the state of available evidence does not permit excluding the possibility of an ABM role for the Tallinn system. However, considering the various additional postulated conditions that would have to be met and the lack of any tangible evidence of their existence, together with the fact that the missile as presently assessed does not seem to be optimized for an ABM role, on balance, he believes it is unlikely that the system presently being deployed possesses an ABM capability.

He believes there are on-going developments in ABM related technologies throughout the Soviet Union, particularly at Sary Shagan, which may provide an improved ABM capability either for the Tallinn system or for some other approach. While we have no evidence that these developments are specifically for the Tallinn system, he believes the continuing deployment of this system should be evaluated with these possibilities in mind.

Army Position on the Tallinn System

Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army, believes that the extensive analysis which has been made of the presently available and limited evidence is still insufficient to estimate with confidence the full capabilities and mission of the Tallinn system, including the design intent. He agrees that the available evidence does support a conclusion that the Tallinn sites have a defensive capability against the aerodynamic threat.

However, he also believes that the system, when augmented by the HEN HOUSE radar, has a capability against ballistic missiles over a substantial portion of the present deployment area. He also believes, however, that those complexes not now covered by such long-range radars probably have no area ABM capability although all currently deployed complexes do have a self and local defense capability. Further, he believes that the Tallinn system has considerable growth potential. He therefore would evaluate its continuing development and deployment with these capabilities and potentialities in mind.

Navy Position on the Tallinn System

Rear Adm. E. B. Fluckey, the Assistant Chief of Naval Operations (Intelligence), Department of the Navy, believes that the Tallinn system has negligible capabilities against ballistic missiles.

Air Force Position on the Tallinn System

Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff, Intelligence, USAF, associates himself with the footnote of Lt. Gen. Carroll, Director, Defense Intelligence Agency, except that he believes that the Tallinn system probably was designed for and now possesses an area antiballistic missile (ABM) capability even without inputs from the HEN HOUSE/DOG HOUSE radars.

He agrees that the Tallinn system, as any ABM system, requires timely and continuing threat information to function properly in that role. In considering the equipment available in the Soviet Union to provide this information besides the HEN HOUSE/DOG HOUSE radars, he notes that the present electronic environment in the Soviet Union contains a variety and number of radars whose precise capability and mission have not yet been established. And he notes continued deployment of these, as well as older, radars to a degree that is not compatible with his view of the aerodynamic threat.

He considers that the configuration of the Tallinn missile, if in fact this element of the Tallinn system is correctly assessed, indicates a capability for exoatmospheric intercepts at a 150 n.m. range at 50 n.m. altitude or a 70 n.m. range at 100 n.m. altitude.

He recognizes that a national command and control system and communications links to the Tallinn complexes would be essential to the effective functioning of the complexes in an ABM role but notes that current evidence neither proves or disproves the existence of such a system.

Lastly, against submarine-launched missiles, he expects OTH radars will be developed which will provide launch detection information for the Tallinn network.

On balance, he believes that no new evidence has become available which would dispel his earlier conviction that the Soviets are probably deploying the Tallinn system against both the aerodynamic and ballistic missile threats, and that the Tallinn system possesses significant capabilities in both a terminal defense and area ABM role.

IV. SPACE SURVEILLANCE AND ANTISATELLITE DEFENSE

57. Since about 1962 the Soviets have been building Hen Houses, probably of a slightly different type than the northern Hen Houses described above. These are located at Sary Shagan in Central Asia and at Angarsk in East Siberia. Some Hen Houses at each location probably survey near space, and have a partial operational capability. Other Hen Houses at each location may be directed upward and would thus more likely have a function of surveying further out in space; these will probably not be operational for several years.

58. [ ] In addition to these radars, the Skrunda and Olenegorsk dual Hen Houses and the Dog House also have a role in space surveillance. The space surveillance radars would enable the Soviets to detect and track satellites during most passes over the USSR. A space surveillance system utilizing these radars [ ] could provide information required by an antisatellite weapon system.

59. We have no evidence of a Soviet antisatellite weapons program, nor of Soviet developments of hardware useful primarily for such a purpose. It would be technically possible, however, for the Soviets to have now a limited antisatellite capability, based on existing radars and missiles and requiring a nuclear weapon to achieve a kill. Nonnuclear kill would require a ground-guided missile system of high precision or a homing missile capable of exoatmospheric maneuver, either of which could be developed in about 2 years after a decision to do so; such development could be well underway without our knowledge. If such a program has been successfully undertaken, the ABM installations at Sary Shagan or Moscow could be used for nonnuclear kill of low-orbiting satellites within 200-300 n.m. of the firing station.[24] We doubt, however, their capability to do this on the first orbit.

60. Soviet ability to cope with satellites in higher orbits (above about 2,000 n.m.) appears very limited. We believe it unlikely that the Soviets can develop systems capable of effectively attacking satellites at synchronous altitudes (19,300 n.m.) during the period of this estimate.[25]

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[24] Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army, believes nonnuclear kill is not presently possible at such ranges, even if a special program to improve the system had been undertaken. A nuclear warhead would most likely be utilized if kill was required [ ]

[25] Rear Adm. E. B. Fluckey, the Assistant Chief of Naval Operations (Intelligence), Department of the Navy, believes it likely that the Soviets can develop such systems during the period of this estimate.

61. Soviet technical capabilities are such that they could develop and deploy during the next 10 years any of several types of antisatellite systems if they chose to do so. They could perfect and deploy a ground-based missile system similar to the current Moscow system; in fact, any further deployment of a long-range ABM system could be adapted for use in an antisatellite role. They might explore techniques (such as electronic interference) for the nondestructive neutralization of satellites. These techniques might utilize mechanisms on the ground, in missiles, or in space. A manned coorbiting satellite inspector could be developed as an outgrowth of a large near-earth manned space station in the early or mid-1970's. Although the costs of such a system would be high, the operational advantages, i.e., inspection, electronic intrusion, capture, dismantling, etc., might outweigh the cost considerations.

62. We believe, however, that the Soviets would realize that any use of antisatellite systems in peacetime would risk opening their own military support systems to retaliation. We think it likely, therefore, that the Soviets would use antisatellite systems only if they believed that war with the US were imminent and that neutralization of our military support systems were consequently an overriding consideration. There might, however, be some other special circumstances in which they would use antisatellite systems in peacetime, such as an occasion in which they believed they were retaliating against US interference with their own satellites.

V. CIVIL DEFENSE

63. The Soviets view their civil defense program as an integral part of their strategic defense effort. This program is controlled by the Council of Ministers through the Chief of Civil Defense, a Soviet marshal, who uses a corps of specially trained civil defense staff officers for the day-to-day operation and coordination of the program. Staff officers are assigned to all levels of the Soviet Government. Operational civil defense units are manned largely by civilians. The civil defense effort is mainly one of training civil defense personnel and the population in evacuation, disaster control, and shelter construction techniques; this is done in close coordination with internal defense organizations and various civilian agencies. This training becomes more widespread and more highly publicized each year. It emphasizes planned urban evacuation in advance of the outbreak of hostilities, and thus appears to assume several days warning. The civil defense staff also plays an active role in disseminating warning.

64. The Soviet Union has taken new steps over the past year in an effort to improve the effectiveness of its civil defense organization. Responsibility for civilian training has been transferred largely to local managerial and government officials, and training for these echelons has increased. Although the civil defense program does not have a high priority call on either budgetary or economic resources, the program is strongly supported by the government, and directly involves all segments of the population.

it unlikely that the USSR will introduce a follow-on heavy bomber into LRA during the period of this estimate.[14]

75. The Soviets have experienced difficulties in bringing the Blinder to operational status. Unless these problems have been resolved, the Soviets may elect to develop a follow-on medium bomber. One possibility is a supersonic-dash aircraft, perhaps with variable geometry wings, having better speed, altitude, and radius than the Blinder; it could be introduced in the 1972-1975 period. An alternate possibility, which could be introduced somewhat later than the dash model, would be a supersonic-cruise medium bomber based on the Soviet supersonic transport development; it would probably have a radius about the same as the Blinder.

F. New Air-to-Surface Missile Development

76. The Soviets are continuing developmental work on ASMs for attack against both land and sea targets. Even though the AS-3, now carried by two models of the Bear, has been operational since 1960, we believe that the Soviets are still trying to improve the weapon. The most likely component to be improved would be the guidance system. It is also possible that the Soviets will develop a new ASM for use with the Bear.

77. We believe that the Soviets are working on an ASM with a range of about 350 n.m. and a cruise speed of Mach 3. We think it unlikely, however, that it has achieved IOC, but the program is probably continuing.

G. Future Force Levels

78. The LRA heavy bomber aircraft are on the average about 8 years old and attrition is beginning to take effect. The strength of the Bear force has not changed appreciably during the past 2 or 3 years, but the number of Bisons has declined. We estimate that over the next 5 years or so the number of Bear ASM carriers will remain relatively constant but that overall heavy bomber strength will decline, due to attrition of the older Bear and Bison free-fall bombers. We estimate that by mid-1972 the heavy bomber force will be comprised of 70-90 Bear ASM carriers and some 65-80 Bisons. We estimate that by mid-1977 this force will consist of no more than 40-60 Bears and 30-50 Bisons.[15]

[14] Maj. Gen. Thomas believes a new heavy strategic aircraft system is likely to be introduced to support the present force level into the mid-1970's. This follow-on system could be an improved Bear with a new ASM or a supersonic aircraft based on research and development relating, in part at least, to supersonic transports.

[15] Maj. Gen. Thomas notes that both Bear and Bison strength has remained unchanged in the past year, and he believes that the USSR will continue to maintain about 200 heavy bombers in operational units throughout the period of this estimate, using a follow-on system to support the force level in the 1970's.

79. Over the past 5 years the strength of the medium bombers in LRA has been declining; the Badger force has been decreasing at an average rate of about 70 aircraft per year and Blinders have not been deployed in sufficient numbers to offset this decline. Since we do not believe that all the Badgers now in the force will be equipped to carry the ASM, we expect a continued reduction in Badger strength. We estimate that by mid-1972 the medium bomber force will comprise some 250-325 Badgers and some 175-225 Blinders. By 1977 the Badger force will probably have declined to some 100-200 aircraft but the number of Blinders will probably have remained relatively constant. If the Soviets introduce a new medium bomber in the 1970's, we believe that it would replace some of the older current types rather than being additional to the above strengths.[16]

VII. COMMAND AND CONTROL

80. Supreme authority over the Soviet Armed Forces is probably vested in the Politburo as a whole, or at least in a committee of the Politburo. In peacetime the political authorities exercise control through the Ministry of Defense. In the event of war the channel would probably run through a Supreme High Command, which would include political as well as military leaders and would have wide powers in the direction of the war effort.

81. During the past 2 years, some elements within the military have emphasized the critical importance of fast reaction and surprise in a modern nuclear environment and have stressed the need for a permanent political-military command organ—apparently similar to the wartime Supreme High Command—to operate in peacetime as well as in wartime. We do not know whether such an organ has in fact been created. We believe that arrangements exist for the quick assumption of command by the political leadership in the event of emergency, but we doubt that any one of the present collective leaders has been given the authority that Khrushchev exercised as "Supreme Commander-in-Chief." We believe that the collective nature of the present leadership works to inhibit such a centralization of command authority at this time.

82. We believe that within the military itself, however, the Soviets are moving toward a highly integrated command structure for their strategic attack forces. There are various indications that during the past year there has been a continuing refinement and improvement of operational controls within those forces.

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[16] Maj. Gen. Thomas expects a more gradual decline in the Badger force and a somewhat larger Blinder force than this paragraph indicates. He estimates a mid-1972 medium-bomber force of 625-725 (rather than the 425-550 in paragraph 79) and a mid-1977 force of 400-600 (rather than 275-425).

ANNEX

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TABLE I

SOVIET INTERCEPTORS: ESTIMATED CHARACTERISTICS AND PERFORMANCE IN AN AIR DEFENSE ROLE

Model	IOC	Maximum Speed at Optimum Altitude (Knots) [a]	Combat Ceiling (Feet) [a b]	Optimum Combat Radius With External Fuel (nm) [a c]	All-Weather Intercept Capability	Radar Range Search/ Track (nm)	Main Armament	Maximum Effective Armament Range (nm)	Attack Capability
Fresco A/B (Mig-17)	1953	570	53,400	540	No; day	..	Guns/Rockets	0.5	Tail
Fresco C (Mig-17)	1954	570	54,500	510	No; day	-/1 [d]	Guns/Rockets	0.5	Tail
Fresco D (Mig-17)	1955	620	54,500	510	Yes	6/2 [e]	Guns/Rockets [e]	0.5	Tail
Fresco E (Mig-17)	1954	605	53,400	540	Yes	6/1 [e]	Guns/Rockets [e]	0.5	Tail
Flashlight (Yak-25)	1955	610	49,400	575	Yes	12/8	Guns	0.5	Tail
Farmer A (Mig-19)	1955	700	48,500	530	No; day	-/1 [d]	Guns/Rockets	0.5	Tail
Farmer B (Mig-19)	1957	700	48,500	530	Yes	6/2	Guns	0.5	Tail
Farmer C (Mig-19)	1957	700	48,500	530	No; clear air	-/1 [d]	Guns/Rockets	0.5	Tail
Farmer D (Mig-19)	1957	700	48,500	530	No; clear air	-/1 [d]	Guns/Rockets	0.5	Tail
Farmer E (Mig-19)	1959	745	45,200	510	Yes	6/3	AAMs	2-3	Tail
Fitter (SU-7) [e]	1959	1,205	57,600	580	No; clear air	-/4 [d]	Guns/Rockets or Guns/AAMs	0.5 5-6 [f]	Tail Tail
Fishpot B (SU-9)	1959	1,205	58,000	540	Yes	11/5	AAMs	3-4	Tail
Fishbed C/E (Mig-21) [e]	1960/1961	1,150	60,500	450	No; clear air	-/4 [d]	Guns/AAMs	5-6 [f]	Tail
Fishbed D (Mig-21) [e]	1962	1,140	59,600	470	Yes	11/8	AAMs	5-6	Tail
Fishbed F (Mig-21) [e]	1965	1,260	62,000	480	Yes	11/8	AAMs	5-6	Tail
Firebar (Yak-28)	1964	1,070	55,000	570 [b]	Yes	22/16	AAMs	10-12	Tail
Fishpot C (SU-9)	1964	1,205	58,000	540	Yes	22/16	AAMs	10-12	Tail
Fiddler	1966	1,100	52,700	1,060	Yes	32/24	AAMs	10-16	360°
Flagon A	1967	1,440	65,000	400	Yes	22/16	AAMs	10-12	Tail/Nose
Foxbat	1970/1971	About 1,700	70,000-75,000	Up to 560 [b]	Yes	40/30	AAMs	15-25	360°
Advanced Long-Range All-weather Interceptor.	1974/1976	Mach 3 cruise	75,000-80,000	700-1,000 [b]	Yes	About 60/45	AAMs	15-40	360°

[a] Maximum speeds, combat ceilings, and combat radii have been calculated independently and cannot all be achieved on the same flight profile.

[b] Current model Soviet Mach 2 interceptors equipped with search/track radars have the capability to make intercepts, with limited effectiveness, in dynamic climb against subsonic targets at altitudes on the order of 70,000 feet when under close GCI direction.

[c] These combat radii are calculated on the basis of subsonic cruise to and from the combat area and 5 minutes maximum speed in the combat area, except for the Advanced Long-Range All-weather Interceptor, which is calculated on the basis of Mach 3 cruise.

[d] These figures are for radars that give target ranges only. The pilot must acquire the target visually and aim by optical gunsight; the range only radar tells the pilot when he can fire.

[e] Some of these aircraft, assigned to Tactical Aviation, and a few in PVO Strany are equipped to carry four AA-1b AAMs; in these cases the search/track radar range is 6/3 n.m., and the maximum effective armament attack range is 3 n.m.

[f] These aircraft have infrared missiles which do not require radar guidance; therefore, visual attack can be made at the effective range of the missile.

[g] There are few Fitters and no Fishbeds in the PVO Strany; both aircraft, however, are deployed in large numbers in Tactical Aviation units. These models are included in the table because of their capabilities as interceptors.

[b] Without external fuel.

TABLE II

SOVIET SURFACE-TO-AIR MISSILE SYSTEMS
ESTIMATED CHARACTERISTICS AND PERFORMANCE

DESIGNATION	SA-1	SA-2 [a] (C-Band)	SA-3	SA-5
IOC	1954	1960-1962	1961	1967
Sites per Complex	56	...	...	3-5
Launchers per Site	48-60 [b]	6	4 Dual	6
Maximum Slant Range (nm)	[c]	27 [d]	About 12	About 75
Maximum Altitude (ft)	[c]	90,000 [e]	Up to 50,000	100,000
Minimum Altitude (ft) [f]	3,000	1,500	About 1,000 [g]	[h]
Target Handling Capability per Site	12-20 [b]	1	1	[redacted]
Simultaneous Rate of Fire (per Site)	12-20 [b]	3 per Target	4 per Target	
Accuracy (CEP in ft)	200	75-150	About 50	
Warhead Weight (lbs)	465 [i]	420 [i]	Up to 200	Up to 1,000 [i]
Mobility	Fixed	Trans-portable	Trans-portable	Fixed

[a] An earlier version of the SA-2 system is no longer deployed in the USSR but is still deployed in East Europe, North Vietnam, and elsewhere.

[b] For the past several years no more than 12 missiles have been seen on launcher per site.

[c] The original system had a maximum slant range of 20-25 n.m. and a maximum intercept altitude of about 60,000 feet. There are indications that the SA-1 range and altitude capabilities probably have been improved. The capabilities of this system could approach those of the SA-2.

[d] This range is estimated for sites equipped with the Fan Song E fire-control radar which is standard in the USSR; for sites equipped with Fan Song C radar, the maximum range is 19-24 n.m.

[e] The SA-2 has some effectiveness above this altitude.

[f] Variations in such factors as target speed and size, radar location, and terrain features could significantly influence low-altitude capabilities.

[g] We have no evidence as to the minimum effective altitude capabilities of this system.

[h] This system was probably not designed to counter the US low altitude threat [redacted] The system may have some capability against targets at about 1,000 feet depending on a number of factors which are not known at the present time.

[i] The Soviets almost certainly will provide some of these missiles with nuclear warheads, and may have begun to do so.

TABLE III

SOVIET ANTIBALLISTIC MISSILE SYSTEM-
ESTIMATED CHARACTERISTICS AND PERFORMANCE[*]

System	Moscow System (ABM-1)
IOC	1968
Maximum Intercept Slant Range	250-350 nm[**]
Minimum Intercept Altitude	[redacted]
Maximum Intercept Altitude	200-300 nm
Radar	[redacted]
Missile	Galosh
Missiles on Launcher	1
Additional Missiles on Site per Launcher	1
Launcher Reload Time	About 30 min
Maximum Velocity	[redacted]
Maximum Warhead Weight	2,000-3,000 lbs
Missile Weight	65,000-70,000 lbs
Launchers/Site	About 8

[*] Lt. Gen. Joseph F. Carroll, the Director, Defense Intelligence Agency, is in full agreement with the above estimated characteristics and performance for the Moscow system. As reflected in his footnote on page 20, however, he believes that the possibility of the Tallinn system possessing an ABM capability cannot be excluded. Although he believes it unlikely, in the event that the Tallinn system is being deployed to perform an ABM role, it is estimated that it would have the following characteristics and performances:

IOC	1967
Sites per Complex	3-5
Launchers per Site	6
Maximum Slant Range (nm)	About 150 nm
Maximum Altitude (nm)	About 100 nm
Minimum Altitude (ft)	[redacted]
Target Handling Capability per Site	[redacted]
Rate of Fire (per Site)	[redacted]
Warhead Weight (lbs)	Up to 1,000
Mobility	Fixed

[*] Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff for Intelligence, Department of the Army, and Maj. Gen. Jack E. Thomas, the Assistant Chief of Staff for Intelligence, USAF, associate themselves with that part of Lt. Gen. Carroll's footnote which pertains to the characteristics and performance of the Tallinn system in an ABM role. For their position on the mission of the Tallinn system, see their footnotes at the end of the section on Missile Defense, page 21.

[**] Full system capability against a RV launched from the US. This is a system range based on a Triad/Galosh combination.

[***] Maj. Gen. Wesley C. Franklin, the Acting Assistant Chief of Staff, Department of the Army, believes maximum intercept slant range to be possibly in excess of 400 n.m. [redacted] gives it this capability and test ranges may be optimum ranges and not necessarily maximum [redacted] A slant range of over 400 n.m. would give a ground range of up to 350 n.m.

[redacted]

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