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Soviet Strategic Defenses

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CONTENTS

SOVIET STRATEGIC DEFENSES

THE PROBLEM

To estimate the strength and capabilities of Soviet strategic air and missile defense forces through mid-1971 and to estimate general trends in those forces over the next 10 years.[1]

CONCLUSIONS

A. Throughout the postwar period the USSR has devoted a major effort to strategic defense. This effort can be attributed primarily to the size and diversity of US strategic attack forces, although for the future the Soviets must consider the threat posed by third countries, particularly China.

Air Defense

B. The Soviets have deployed in depth a formidable system of air defenses, which is very effective against subsonic and low-supersonic aircraft at medium and high altitudes. The system is less effective against higher performance aircraft and standoff weapons; it has virtually no capability against penetration below about 1,000 feet except in a few, limited areas.

C. At present, the major effort is directed against the threat posed by high-performance aircraft and standoff weapons. The SA-5, which represents a considerable improvement over older systems in terms of range, velocity, and firepower, is being deployed as a barrier defense around the European USSR and for point defense of selected

[1] This estimate considers only those Soviet strategic defensive forces located in the USSR and Eastern Europe. The Soviet anti-submarine warfare effort, with its implications for Polaris, will be discussed in the forthcoming NIE 11-14-69, "Soviet and East European General Purpose Forces."

targets. There are about 40 operational SA-5 complexes and we believe that about 100 complexes will be operational by 1973. In addition, the Soviets are deploying supersonic, high-altitude interceptors. They have an airborne warning and control system (AWACS) in limited operation. This system, when used in coastal areas and with long-range interceptors, could greatly extend the area in which incoming aircraft could be engaged.

D. To cope with low-altitude attack the Soviets have deployed all-weather interceptors with improved capabilities, and they are continuing to deploy the SA-3, primarily along the Black Sea and Baltic Sea approaches. More advanced radars, SAMs, AAMs, and interceptors better suited for low-altitude defense will probably be introduced. The primary limitation on low-altitude defense, however, is surveillance and control. Through the dense deployment of new radars, the Soviets have improved tracking capabilities in a few areas down to altitudes of 500 feet and even below, but we do not expect them to extend such deployment to large areas of the USSR.

Ballistic Missile Defense[2]

E. Ballistic missile early warning and initial tracking would probably be provided by large, phased-array dual Hen House radars. Those now operational in the northern USSR are intended primarily to detect ICBMs launched from the US. They also provide some coverage of the Polaris threat from the north and northwest. The Soviets will probably take steps to provide additional early warning coverage against ICBMs, against Polaris, and against the Chinese missile threat.

F. The Moscow ABM system (ABM-1), under deployment since 1962, has achieved some operational capability. Apparently the Soviets will deploy only about half as many ABM-1 launchers as originally planned. The launch sites still under construction should be operational in 1970. The Soviets are probably also making some improvements in the ABM-1.

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[2] Maj. Gen. John F. Freund, Acting for the Assistant Chief of Staff for Intelligence, Department of the Army, and Maj. Gen. Jammie M. Philpott, the Assistant Chief of Staff, Intelligence, USAF, consider that this section underestimates the Soviet missile defense (ABM) capability. For their views, see footnote on page 15.

G. Our analysis of the Moscow system indicates that, as presently deployed, it will furnish a limited defense of the Moscow area, but that it has some weaknesses. It appears to have little ability to handle such sophisticated threats as long chaff clouds and certain other penetration aids; the small number of launchers and the apparent limitations of the fire control radars make the system highly susceptible to saturation and exhaustion. Its capability to deal with nuclear blackout is probably not high, and none of the system components appear to be hardened to withstand the effects of nuclear bursts. Finally, the Moscow system is primarily an anti-ICBM system; it provides long-range radar coverage of only a part of the multidirectional Polaris threat.

H. We believe that the Soviets are developing a follow-on ABM system. Like the Moscow system, it will probably be designed for long-range, exoatmospheric intercept; it could become operational in the 1974-1975 period. We have no evidence that the Soviets are developing a short-range intercept system comparable to the US Sprint. If they do, it would probably not begin to enter service before the late-1970's.

I. We still have no evidence of ABM deployment outside the Moscow area; any extension of ABM defenses will probably await the availability of the system now under development. The logical first step in any future deployment would be to augment the defenses of Moscow. The extent of deployment beyond Moscow will depend heavily upon economic as well as technical considerations. Deployment of a national defense system on a scale sufficient to cope with the full US missile threat does not appear to be a feasible course of action for the USSR within the period of this estimate. We believe that the Soviets will decide upon a program that would provide some defense for the most important target areas in the USSR. Some part of this defense would probably be deployed against Communist China and other third country threats.

Anti-satellite Capabilities

J. With existing radars and missiles armed with nuclear warheads, the Soviets could almost certainly destroy or neutralize current US satellites in near earth orbits during an early phase of their mission.

With terminal guidance, they could probably use a non-nuclear warhead to neutralize satellites. During the last year we have seen evidence that the Soviets may be developing a co-orbital anti-satellite system. Neither inspection nor destruction operations have been specifically identified, but the activity observed seems more applicable to an anti-satellite mission than any other. This system now probably has a limited capacity to intercept US satellites, but a fully operational capability is not likely before 1971.

DISCUSSION

I. SOVIET STRATEGIC DEFENSE POLICY

1. Soviet strategic defense forces have gone through several stages of development since World War II. Through the mid-1950's the Soviets attempted to counter the large US strategic bomber force 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 deployment of a standoff capability with air-to-surface missiles (ASMs), was followed by Soviet deployment of the Fiddler interceptor and the SA-5 system and development of the Foxbat interceptor, all of which have greater ranges than earlier systems.

2. In their efforts to have a defense in being against an immediate threat, the Soviets have generally deployed a system quite early in the development cycle, 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 may give the defenses as a whole a greater capability than analysis of each weapon system alone would indicate.

3. Soviet military planners undoubtedly estimate that the three major elements of US strategic attack forces—bombers, ASMs, intercontinental ballistic missiles (ICBMs), and submarine-launched ballistic missiles (SLBMs)—will become more sophisticated and formidable with the incorporation of improvements:

new aircraft, ASMs, aerodynamic and ballistic penetration aids, and multiple independently-targeted re-entry vehicles (MIRVs). Moreover, the weight of a US attack would be increased somewhat by the strategic forces of Britain and France. For the period of this estimate, the US and its allies will continue to pose the principal strategic threat to the USSR.

4. It is difficult to measure the degree of tension which exists between the Soviet Union and Communist China but it has become apparent that Soviet military planners must be concerned with the emerging Chinese strategic threat. The Soviets are continuing to strengthen their defense posture along the Chinese border. The Soviets appear to be pacing their defensive posture vis-a-vis China at a rate which they believe matches the Chinese offensive capability. Thus, we do not anticipate any major defensive shift within the next few years.

5. The Soviets probably judge 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, but that 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, however, is defense against ballistic missiles. The nature and extent of further anti-ballistic missile (ABM) development and deployment is almost certainly one of the major questions of Soviet military policy.

6. 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 present Soviet leadership has shown a general disposition to accommodate military programs, and military expenditures have continued to rise. Moreover, within the military establishment strategic defense has long enjoyed a favored position. 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. Soviet expenditures in 1969 for the strategic defense mission are estimated at 2.2 billion rubles, about 10 percent of the total outlays for defense and space. For the near term, at least, expenditures for strategic defense will probably be maintained at the present level, while military expenditures as a whole continue to rise. The trend for the longer term will depend heavily upon Soviet decisions concerning ABM deployment—potentially the most costly single military program on the horizon—and the related question of strategic arms control. We have not considered the effects of any arms limitation agreement in this estimate.

II. AIR DEFENSE

7. Soviet strategic air defense forces are subordinate to the PVO Strany (Anti-air Defense of the Country), one of the major Soviet commands. They are composed of three major elements, which carry out air surveillance, interceptor, and

SAM operations. These forces are deployed throughout the USSR in a hierarchy of geographical divisions and subdivisions linked by multiple communications channels. We believe that the major divisions are 10 air defense districts (ADDs), which are subdivided into some 40 air defense zones (ADZs). Although 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 almost certainly exercised primarily at the ADZ level.

8. In addition to the forces directly assigned to it, the PVO Strany also exercises operational control over air defense elements of the general purpose forces at such times as those elements are required for defense of the USSR.[3] In Eastern Europe, air defense of the Soviet forces rests with the local air defense commander; air defense of each Warsaw Pact country is the responsibility of that country. Both, however, co-operate with the PVO Strany in the USSR and in effect constitute a westward extension of Soviet air defense. With Soviet assistance, Mongolia has established an air defense system which probably is also closely co-ordinated with the PVO Strany. We believe that co-operation between the air surveillance systems of the USSR and Communist China has ceased.

9. The command, control, and communications network of PVO Strany has a high degree of redundancy, flexibility, and reliability. We believe that the semi-automatic air surveillance reporting system introduced over 10 years ago has been extended further throughout the USSR, to the Groups of Soviet Forces, and to a number of other Warsaw Pact countries. We estimate that some three-fourths of the ADZs now employ this system in varying degree, and that it will be extended to all ADZs. Some SAM units are almost certainly included in this system.

10. During the past year the Soviets have undertaken a number of passive air defense measures aimed at improving the survivability of their air defense forces both in the USSR and Eastern Europe. In the interceptor force these have included camouflage, dispersal, and construction of revetments and hardened shelters.

A. Forces Through Mid-1971

Air Surveillance and Control Systems

11. The present Soviet early warning (EW) systems can detect aircraft at altitudes well above the combat ceiling of any current or planned US or NATO combat aircraft. We continue to estimate that there are 850-1,000 radar sites. Improved data and further analysis lead us to believe, however, that there are

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[3] While AAA is not assigned to PVO Strany, it is readily available and the Soviets would probably employ AAA in defense of key military areas. The air defense capabilities of Soviet general purpose forces are discussed in the forthcoming NIE 11-14-69, "Soviet and East European General Purpose Forces."

2,700-3,600 individual radars instead of the 4,000-5,000 estimated previously. Coverage is particularly dense west of the Urals. Soviet sites are supplemented by over 400 sites containing about 1,800 radars in the Warsaw Pact countries of Eastern Europe. The density of radar coverage improves the likelihood of detection, and frequency diversification also provides defense against electronic countermeasures (ECM). In addition the Soviets have an Airborne Warning and Control System (AWACS) in limited operation, which will extend their radar coverage.

12. We believe that radar surveillance ships subordinate to the Soviet Navy on occasion provide radar tracking data to PVO Strany facilities. Although these ships are not routinely deployed, we believe that data from such vessels could be made available to air defense centers as needed.

Interceptors

13. Fighter Aviation of Air Defense (IAPVO) has the primary mission of air defense of the homeland. We estimate the size and composition of IAPVO over the next few years as follows:

ESTIMATED INTERCEPTOR FORCE LEVELS

	1 July 1969	Mid-1970	Mid-1971
OLDER MODELS			
Fresco	1,275–1,325	1,150–1,200	950–1,050
Farmer	350–400	300–350	250–300
Flashlight	175–200	175–200	150–175
Fishpot	750–800	750–800	750–800
NEWER MODELS			
Firebar	350–400	350–400	350–400
Fiddler	75–100	100–125	125–150
Flagon A	225–250	350–375	475–500
Foxbat	...	0–25	25–50
TOTAL	3,200–3,475	3,175–3,475	3,075–3,425

In addition, there are approximately 2,900 fighters in Soviet Tactical Aviation and 2,450 in the East European countries of the Warsaw Pact; most of these 5,350 aircraft were designed as interceptors and some 3,600 of them are in fighter regiments having a primary mission of air defense of the theater forces.

14. About 55 percent 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. Most of these are day fighters limited to attack ranges of a half-mile or less. Some 25 percent of the force consists of the Fishpot, Mach 2 all-weather interceptors introduced in 1959-1964; most of these are armed with air-to-air missiles (AAMs) having ranges of 2-4 n.m., and capable of tail attack only.

15. The remainder of the force is made up of new all-weather interceptors—Firebar, Fiddler, and Flagon A—which have entered service since 1964. These

are capable of speeds of from about Mach 2.0 to Mach 2.5, are equipped with AAMs and airborne intercept (AI) radars with improved range, and can perform multidirectional attacks. They have provided the force with a capability to intercept targets at both high and low altitudes, as well as at greater distances from the target areas.

16. The combat ceilings of these aircraft range from 50,000 to 60,000 feet; using a snap-up technique with the new AAMs, they are capable of intercepting targets at much higher altitudes. The Firebar is deployed primarily for defense against low-altitude penetrations and can perform effective all-weather intercepts from both head on and tail attacks at altitudes down to about 1,000 feet. The Fiddler has a combat radius of 760 n.m. and can carry out attacks from any angle. Used in conjunction with an AWAC system the Fiddler could provide an improved defense against the standoff threat. The Mach 2.5 Flagon A is the fastest Soviet interceptor in service; designed for point defense, it provides improved reaction time and intercept capability against supersonic targets at medium and high altitudes.

17. A new interceptor, the Foxbat, is one of the most advanced aircraft of its kind in the world. It has an estimated maximum speed of about Mach 3, a combat ceiling of over 75,000 feet, a supersonic combat radius of 580 n.m., and a 360 degree attack capability. We believe that Foxbat is now in series production, and that it will enter service next year.

Surface-to-Air Missiles

18. The SA-1 system, deployed more than 15 years ago in a double ring around Moscow is still operational. Under normal conditions, the Soviets apparently keep only about 20-25 percent of the 3,255 launchers in a state of readiness. In time of crisis, however, we believe that 75-100 percent of the launchers could be made operationally ready. There are indications that nuclear warheads are available at some SA-1 sites and that the system has a nuclear option.

19. The SA-2 is the most widely deployed SAM in the USSR. While additional SA-2 sites were identified during the past year in the USSR and in Eastern Europe, we believe the deployment of the system was essentially complete by the end of 1965. We estimate that there are now some 840 operational sites of 6 launchers each in the USSR, and that there are another 250 unoccupied sites which are probably intended to provide alternate or supplementary positions during periods of emergency. Most of the operational sites are occupied by PVO Strany battalions, but some 10-20 are probably manned by the air defense troops of the ground forces. We believe that Soviet ground forces have about 35-45 additional SA-2 battalions in garrison in the USSR and some 40 deployed in Eastern Europe. The air defenses of the East European countries include some 140 SA-2 sites manned by national forces.

20. Since its initial deployment, the SA-2 has undergone several model changes, which have progressively increased its maximum effective range, improved its maximum and minimum intercept altitude capabilities, and given it better tracking and electronic counter-countermeasure (ECCM) capabilities. In addition there are indications that some SA-2 sites have nuclear as well as conventional warheads available.

21. We estimate that in the past year, deployment of the low-altitude SA-3 system continued at an average rate of five starts per month. There are now an estimated 150 operational SA-3 sites and some 50 unoccupied sites. The new deployment has been primarily along the Black Sea and Baltic Sea approaches, although some has probably occurred in the Soviet Far East. There was no additional SA-3 deployment into Eastern Europe during the past year. We now believe that deployment of the SA-3 will continue for at least two more years.

22. Deployment of the SA-5 long-range SAM system has continued during the past year. We estimate that there are now some 70 complexes, of which about 40 are operational. The system is being deployed as a barrier defense around the European USSR and for point defense of selected targets. We believe that most if not all of the identified complexes will be operational by mid-1971.

23. The SA-5 could have a nuclear warhead capability, but we have no evidence that such is the case. We believe that the SA-5 is equipped with a homing guidance system, and possibly a proximity fusing system. This manner of guidance would give a high probability of kill with a conventional warhead.

B. Capabilities Through Mid-1971

Against the Medium- and High-Altitude Threat

24. Soviet air defenses have a formidable capability under all weather conditions against subsonic and low-supersonic (less than Mach 1.5) aircraft attempting to penetrate at medium and high altitudes to principal target areas. Moreover, Soviet capabilities against higher performance targets are being improved by the introduction of new interceptors and the SA-5. Under optimum conditions, where detection and tracking is limited only by the radar horizon, the Soviet ground-based EW system extends 200-250 n.m. from Soviet borders. Under normal operating conditions detection and tracking at medium and high altitude is virtually assured out to about 135 n.m. The detection range of the ground-based EW system is progressively reduced against aircraft penetrating at lower altitudes, primarily because of line-of-sight limitations.

25. The Soviets have continued testing of their AWACS that could considerably extend their coverage over the sea approaches to the USSR. This system uses the Moss (a modified Cleat transport) as a platform for long-range radar surveillance and for the data processing and communications for interceptor control. We

estimate that some 8-10 Cleats have been so modified. Additional Cleats may be converted (some 35-40 have been produced), but we have no evidence that this is being done. Other transport aircraft could also be modified for the AWAC system.

26. Present AWACS aircraft normally operate some 150-200 n.m. from the coastline of the USSR, and it may be that the system will be operationally employed in this manner. Such operations would provide overlapping coverage between shore radars and the AWACS radar (which has a range of about 200 n.m.), facilitating control of the interceptor aircraft and extending the range at which aircraft using the sea approaches could be detected. The area and frequency of search would, of course, be limited by the number of AWACS aircraft available; extensive deployment of the system would deny to a large extent undetected low-altitude penetrations over the sea approaches. We believe the Fiddler, Firebar, and Foxbat will be employed with AWACS aircraft. We believe that the system could handle as many as eight or nine interceptors at a time.

27. The Soviet interceptor force has good capabilities against subsonic and supersonic aircraft at altitudes from 2,000 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. Present Soviet manned intercept capabilities against maneuvering supersonic targets flying at speeds of over Mach 1.5 and at altitudes above 65,000 feet remain marginal but they are being improved with the continuing deployment of Flagon A and Fiddler. Further improvement will be realized with deployment of Foxbat.

28. Soviet SAM systems provide good medium- and high-altitude defense against subsonic and low-supersonic aircraft and ASMs under all-weather conditions. The SA-5 represents a considerable improvement over older systems in terms of range, velocity, and firepower. We estimate that it is capable of engaging aircraft and ASMs traveling at speeds up to about Mach 3 and at altitudes to about 100,000 feet. The maximum effective range of this system is probably on the order of 50 n.m. for ASMs and 100 n.m. for aircraft. We believe that nuclear warheads are available at some SA-1 and SA-2 sites, and they may have been provided for the SA-5; such warheads, of course, greatly increase kill probability.

Against the Low-Altitude Threat

29. While the Soviets are well aware of the low-altitude penetration threat to their air defenses, Soviet efforts over the past year have again resulted in some improvements but not in any fundamental solution to the problem. In spite of Soviet efforts, the primary limitation in low-altitude defense continues to be surveillance and control. The capabilities of the Soviet air defenses to intercept aircraft or ASMs flying at low altitudes decline with the altitude, and at very low altitudes are limited by the line-of-sight of ground radars and by the difficulty of tracking a target and interceptor through ground clutter. Generally,

in Eastern Europe, the western USSR, and the approaches to major military-industrial centers, the air surveillance network is capable of maintaining a continuous track on aircraft flying down to about 1,000 feet. In areas of less dense coverage, Soviet radars are unlikely to be able to accomplish continuous tracking below 3,000 feet.

30. The Soviets have continued the deployment of radars on towers which improves line-of-sight coverage of targets at very low altitudes. These radars have some capability to detect moving targets against ground clutter. They are deployed in western USSR and Eastern Europe. Where deployment is sufficiently dense, tracking capability is probably somewhat below 500 feet; in the Leningrad area it may be as low as 100 feet. Future deployment of this sort will probably be limited to likely approach corridors; we do not expect them to extend such deployment to large areas of the USSR.

31. In recent years we have detected improvements in the AI radars employed by Soviet fighters. These improvements provide some capability to operate in a ground clutter environment. Some 400 interceptors (Firebar) in IAPVO probably now have an intercept capability in all weather conditions down to 1,000 feet over favorable terrain (and somewhat lower over water). In clear daylight the older model interceptors, still operational in large numbers, would also be used for low altitude area intercept under visual conditions against slower aircraft. Although we believe the Soviets are working on a look-down capability for their interceptors, we do not expect an operational capability before about 1972.

32. Improved guidance radars and in some cases their emplacement on mounds have given the SA-2 system of the type deployed in the USSR a capability down to about 1,000 feet. In addition, analysis of the SA-3 electronics has led us to believe that under favorable circumstances including optimum acquisition this system can intercept aircraft at about 500 feet at a range of 2-7 n.m. Depending on the actual conditions of weather, site-masking, elevation of the fire-control radar, speed and reflective area of the target, the minimum altitude could be as low as 300 feet at ranges of 2-4 n.m. We have no technical evidence concerning the low-altitude capabilities of the SA-5 guidance system, but doubt that it is suitable for use at low altitudes.

Against the Standoff Threat

33. Fiddler, Flagon A, and Firebar presently have some capability to intercept ASMs but to do so, they require precise ground control. Only Fiddler has the range capability at present to intercept the ASM carriers before they come within ASM range of Soviet borders. The deployment of the Foxbat interceptor along with the already operational Fiddler, together with AWACS aircraft and possibly with picket ship EW and GCI, will extend the areas in which ASM

carrier aircraft can be engaged as much as several hundred miles farther from critical target areas. The SAM barrier defenses will cause the attackers to face an increasing volume of defensive fire as they approach their objectives. The SA-5 with a range of about 100 n.m. will greatly increase the probability of intercept of supersonic aircraft at medium and high altitudes. Should the ASM carriers successfully launch their missiles, the SA-5 system is probably capable of intercepting incoming ASMs at medium and high altitudes at distances as great as 50 n.m., while the SA-2 could do so at ranges of 20-25 n.m.

34. The present air defense deployment best protects the Soviets against a standoff threat directed at European USSR from the north and northwest. They are apparently more vulnerable from the south, but are improving their capabilities. Fiddler deployment and SA-5 point defense of military-industrial complexes will improve defense in the central and eastern USSR. We believe that the Soviets will be able to provide the entire European USSR with good defense against current ASMs at medium and high altitude within the next few years.

In An Electronic Countermeasure Environment

35. The use of ECM can appreciably degrade the performance of air defenses. The Soviets practice a great deal in an ECM environment. Even older interceptors are known to have some ECCM capability. Newer types such as Fiddler use more sophisticated measures and are probably immune to jamming by most current western AI jammers. There is evidence that new higher frequency (K-Band) AI radars have been introduced in Tactical Aviation; this change may also have been made in the IAPVO. We believe that the new Soviet interceptors now being deployed are equipped with infrared and semiactive missiles and with data link for GCI, both of which improve their capability in an ECM environment.

36. All Soviet SAM systems are designed to operate in an ECM environment. Virtually all SA-2s in the USSR have been provided with improved fire control radar (C-Band) with a better ECCM capability. About half the SA-2 battalions are now equipped with the latest variant which probably provides even better ECCM capability and slightly greater range. We expect SA-3 and SA-5 systems to incorporate similar improvements.

Future Capability

37. Soviet planners almost certainly expect a diverse aerodynamic threat from US and NATO forces to continue well into the 1970's. They probably see an aircraft threat ranging from low-altitude subsonic speeds up to Mach 3 at high altitudes, and an ASM threat at supersonic speeds and at both high and low altitudes. They probably consider that the deployment of the Fiddler-Moss team, the Flagon A, the Foxbat, and the SA-5 will deal reasonably well with the

medium- and high-altitude threat posed by both aircraft and ASMs. But they must be concerned about the requirements for adequate air defense below 1,000 feet. We believe that they will continue to exert major efforts in the 1970's in an attempt to meet this requirement.

38. Soviet reliance on close GCI is the main limitation on their low-altitude interceptor defense capabilities. This approach requires the controller to maintain an almost continuous track on both attacking aircraft and interceptors. In order to maintain the track, ground radars must be closely spaced, which has been observed only in small areas of the USSR. Moreover, when a large number of targets is involved, short identification and evaluation time pose a requirement for rapid communication and data processing which is probably beyond the capabilities of the system. We expect the further Soviet development of radars and techniques specifically designed to handle low-altitude penetration in specific areas, but we foresee little Soviet improvement in ground-based continuous tracking capability at low altitude for large areas of the USSR.

39. An improvement in low-altitude intercept capability could be achieved by using airborne look-down radar than can both distinguish and track moving targets against ground clutter together with a compatible AAM. New Soviet interceptors probably have a limited ground clutter suppression capability, but no true look-down capability. There are some indications that the Soviets are developing a radar with an airborne overland look-down capability and a compatible AAM, but we have not detected such systems, and believe, therefore, that they would not be operational before 1972. The first interceptor incorporating these capabilities will probably be the Foxbat; however, Foxbat is expected to have an AI radar and an AAM of existing types when initially deployed in 1970-1971.

40. In order to utilize interceptors most efficiently against low-altitude targets, the Soviets would need an AWACS radar capable of detecting targets against ground clutter. Although we do not know the state of development of such a system in the USSR, the Soviets could deploy an operational system in the mid-1970's. The Soviets could also develop and deploy an advanced all-weather Mach 3 cruise interceptor with the range of Fiddler and a look-down shoot-down capability; however, to date, such a program has not been detected. We doubt that such an interceptor could become operational before 1976-1978.

C. Forces Through Mid-1979

41. 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 remain substantially at the present level. 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 new ones are introduced, and the number of radars will gradually decline over the next decade.

42. The Soviets have in the past kept larger numbers of the older model interceptors in service longer than we expected; moreover, tension on the Sino-Soviet border may encourage this practice. Even so, as new interceptors are being deployed in increasing numbers, the need for extremely large numbers of aircraft for strategic defense should diminish. We estimate that the numbers of interceptors in IAPVO will decline to about three-fourths of the present level by 1975 and to between one-half and two-thirds of the present level by 1979. The overall capability of the force will improve during the next decade even though there is this decline in the number of aircraft.

43. The current inventory of SAM systems in the USSR provides good medium- and high-altitude defenses against both aircraft and ASMs. Improvements in the low-altitude capabilities of current SAM systems have probably approached the limits of these systems. To further improve low-altitude SAM capabilities, the Soviets would probably have to develop a new system with technology specifically tailored to this purpose and deploy it widely. A new purely low-altitude SAM system should possess not only a better low-altitude capability than the present SA-3 system but provide increased range capability at low altitudes. Such a system could probably be deployed in the mid-to-late 1970's, as a supplement rather than as a replacement for the existing SA-3 system. To date, however, there is no evidence of a Soviet development program for any new low-altitude strategic SAM system, although there is continuing testing and development of tactical SAMs.

44. We believe 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, we estimate that some 100 complexes will be operational by 1973. If the Soviets should decide to continue deployment of the SA-5, another 40 complexes might be operational by 1976.

45. 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 command and control system. We believe the Soviets will extend the GCI and SAM semi-automatic data system to all ADZs. We would expect further Soviet attempts to improve the capacity, flexibility, and security of air defense command and control communications. Improved data systems would significantly increase Soviet target handling capability and these are probably being deployed or incorporated into the air defense system. The addition of such multiple sensor control and rapid updating of tracking data would be consistent with the introduction of higher performance weapons and automatic control systems.

46. 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. Such a system would permit these interceptors to operate in a controlled environment, allowing close co-ordination of intercepto. and SAM operations. However, we continue to have no evidence of such a Soviet system.

III. MISSILE DEFENSE [4]

47. We believe that PVO Strany also has the mission of defense against ballistic missiles and space vehicles, but we have little information on command and control. There is probably a central control agency for ballistic missile defense, but its location is not known. Possible locations include the Dog House radar site at Naro Fominsk and the hardened command post at Monino, both near Moscow.

A. Early Warning

48. Ballistic missile early warning and initial tracking would probably be provided by large phased array dual Hen House radars. Two of these, one at Olenegorsk on the Kola Peninsula and the other at Skrunda in Latvia, are intended primarily to cover ICBMs launched from the US against targets in the western USSR. They also provide some coverage of the Polaris threat from the north and northwest, but coverage in the direction of the Mediterranean is lacking. The Soviets will probably take steps to provide additional early warning coverage against ICBMs, against Polaris, and against the Chinese missile threat.

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[4] Maj. Gen. John F. Freund, Acting for the Assistant Chief of Staff for Intelligence, Department of the Army, and Maj. Gen. Jammie M. Philpott, the Assistant Chief of Staff, Intelligence, USAF, consider that this section underestimates the Soviet missile defense (ABM) capability. They believe the state of available evidence is such that an ABM role cannot be excluded for the SA-5 (Tallinn) system.

Because of the continuing uncertainties in the development and deployment of the system, the following mission and capabilities must be considered:

a. It is highly probable the system was developed to provide an atmospheric intercept capability against medium- and high-altitude aircraft, air-to-surface missiles, medium-range ballistic missiles, and submarine-launched ballistic missiles. This judgment is believed to be consistent with both the analysis of presently observed system components and available evidence on ABM testing.

b. It is possible the system also was designed to enable exoatmospheric point-in-space ABM intercepts, in which mode the SA-5 would be dependent upon external tracking sensors, such as the Hen House/Dog House type radars or some other long-range radar, a centralized command and control system, and the use of nuclear warheads. Evidence currently available neither confirms nor denies the existence or interrelationships of these elements.

c. It is also possible that the SA-5 could perform endoatmospheric intercept against the larger RVs or RVs accompanied by tankage. In this mode, a homing system and a proximity fuzing system for the SA-5 would increase its effectiveness.

49. [ ] the Hen House radar [ ] system has a detection range [ ] against missiles launched from the US toward most targets in the western USSR. There are some indications, however, that such a high degree of accuracy could not be achieved for large numbers of targets simultaneously. Moreover, the Hen House radars would probably be highly susceptible to blackout in a nuclear attack. These characteristics, together with the fact that these radars are soft and vulnerable, indicate that their primary function is to provide warning of a ballistic missile attack. Thus, it is not likely that the Soviets would rely on these radars for critical acquisition and tracking information after a missile attack was underway.

B. The Moscow System (ABM-1)

50. Deployment of the launch sites for the Moscow ABM system (ABM-1), underway since 1962, is probably nearing completion. We believe that three complexes are now operational and that the fourth will be next year. Each complex has 16 erector-launchers. Thus, the ABM-1 system will have a total of 64 launchers, a substantial cutback from the level originally planned.

51. The primary acquisition and target tracking function for the ABM-1 system is performed by the Dog House, another large, phased-array radar. The Dog House is less susceptible to nuclear blackout than the Hen House, and its location within the Moscow defenses gives it some protection against direct missile attack. [ ]

[ ] It will probably be used to control the assignment of targets to the launch complexes.

52. The Dog House will provide radar coverage in two opposite directions. The northwest face is oriented toward the US ICBM threat; the southeast face, toward the Indian Ocean. The northwest face is probably operational now, and the southeast face probably will be in 1970. We believe that the Soviets are deploying another large phased-array radar near Moscow, probably to supplement the Dog House coverage.

53. The fire control element of the Moscow system consists of a large radar and two small radars deployed in a group (called a Try Add); there are two such groups at each of the four launch complexes. We believe that the large Try Add radar is the final target tracker and that the two small radars track and control the interceptor missiles. The large radar receives its acquisition information from the Dog House [ ]

[ ]We believe that it can track only one, or at most, a very few targets at a time. It may have some limited capability to acquire targets. Each small Try Add radar can probably control only one interceptor missile at a time. Thus the system as a whole, with its eight Try Add groups, could cope with only a small number of targets simultaneously.

54. The Moscow system has a maximum effective slant range of about 350 n.m. It employs the Galosh interceptor missile which is launched from a canister. The system is apparently designed to have a refire capability; reload time is probably about 15 minutes.

55. We continue to believe that the Moscow system is intended for exoatmospheric intercept using a thermonuclear warhead. Recent analysis suggests that the Galosh warhead may have a smaller yield than[ ]previously estimated. In either case, however, the Dog House at its operating frequency would be susceptible to the nuclear blackout effects and the ABM-1 system would be dependent upon the Try Add and the Dog House radars with reduced effectiveness.

56.[

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57. The foregoing analysis of the Moscow system indicates that, as presently deployed, it will furnish a limited defense of the Moscow area, but that it has some weaknesses. It appears to have little ability to handle such sophisticated threats as long chaff clouds and certain other penetration aids; the small number of launchers and the apparent limitations of the Try Add radar make the system highly susceptible to saturation and exhaustion. Its capability to deal with nuclear blackout is probably not high, and none of the system components appear to be hardened to withstand the effects of nuclear bursts. Finally, the Moscow system is primarily an anti-ICBM system; it provides long-range radar coverage of only a part of the multidirectional Polaris threat.

Other Missile Systems

58. We still have no evidence of ABM deployment outside the Moscow area. Evidence acquired during the past year has reinforced our judgment that the

SA-5 is a long-range SAM system and that it is highly unlikely to have any present ABM capability.[5] [6]

59. It would be possible to adapt or convert SAMs, MRBMs, IRBMs, or even ICBMs to an ABM role, although this would derogate from or negate their effectiveness in their primary role. To weld large numbers into an ABM *system*, however, would be another matter. The main problem would be command and control, especially the provision of timely acquisition and tracking data. The Hen House and Dog House radars remain the only ones available for the latter function. The vulnerabilities of the Hen Houses have already been described, and additional requirements would be placed on the Dog House, busy with the demands of the Moscow ABM-1 system. Moreover, any command and control system which would be theoretically adequate would be exceedingly intricate and costly, and its reliability under operational conditions would at best be questionable. For these reasons we think it highly unlikely that the Soviets would find it advantageous to develop a significant ABM capability based on any of these missile systems.[7]

C. Development and Future Deployment

System Development

60. Current development activity will probably bring some improvement in the ABM-1. In mid-1968 the Soviets began testing an interceptor missile that is probably a modification of the Galosh; it could be available as early as next year. Other elements of the system presently deployed at Moscow may be improved—we doubt that they will be replaced.

61. We believe that the Soviets are developing a follow-on ABM system, building upon their experience with the Moscow system and its technology. Such evidence as we have indicates that the new system, will, like the ABM-1, be designed for long-range exoatmospheric intercept. Presumably, this development is aimed primarily at overcoming principal shortcomings of the Moscow system:

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[5] Lt. Gen. Donald V. Bennett, the Director, Defense Intelligence Agency, agrees that evidence acquired during the past year supports the judgment that the SA-5 is a long-range SAM system. Although he believes the system is unlikely to have a present ABM capability, he emphasizes that the state of available evidence does not permit excluding this possibility.

[6] For the views of Maj. Gen. John F. Freund, Acting for the Assistant Chief of Staff for Intelligence, Department of the Army, and Maj. Gen. Jammie M. Philpott, the Assistant Chief of Staff, Intelligence, USAF, see their footnote to Section III, page 15.

[7] Maj. Gen. John F. Freund, Acting for the Assistant Chief of Staff for Intelligence, Department of the Army, and Maj. Gen. Jammie M. Philpott, the Assistant Chief of Staff, Intelligence, USAF, believe this paragraph does not accurately evaluate the possible use of SAMs in an ABM role. They believe that it is possible the Soviets would opt for a dual ABM/SAM system, even if this provided only marginal improvements, especially in view of the fact that a follow-on system to the ABM-1 could not become operational until 1974-1975 at the earliest. For their views on the SA-5, see the footnote to Section III, page 15.

its limited target-handling capacity and its cost. Such a follow-on ABM system could become operational as early as 1974-1975.

Other Possible Developments

62. We have no evidence that the Soviets are developing a short-range intercept system comparable to the US Sprint. We have not detected any test program for a high-acceleration missile that is required for such a short-range, endoatmospheric intercept. Nevertheless, we believe that the Soviets will eventually see the need to supplement their long-range defenses with such a system for point defense. Deployment of such a system could begin in the mid-1970's, but [ ] believe that it would probably enter service later.

63. We have no evidence now of an operational over-the-horizon detection (OHD) 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 also now be developing space-borne systems (such as infrared launch detection sensors) which could be used in support of their strategic defense forces.

ABM Deployment

64. Because of its inherent weaknesses, it seems to us highly unlikely that there will be any further deployment of the ABM-1 in its present form. Any follow-on system the Soviets deploy will probably have a greater target-handling capability. It is unlikely that there will be any large-scale deployment of a terminal intercept system within the next 10 years.

65. The logical first step in any future ABM deployment would be to augment the defenses of Moscow. The extent of ABM deployment beyond Moscow will depend heavily upon economic as well as technical considerations. Deployment of a national defense system on a scale sufficient to cope with the full US missile threat does not appear to be a feasible course of action for the USSR over the next 10 years. Programmed improvements in US forces and the potential threat from China, however, have almost certainly added to the already existing pressures to provide defenses for key target areas. The US decision to proceed with ABM deployment has probably also strengthened these arguments. We believe that the result is likely to be a compromise, and that the Soviets will decide upon a program that would provide some defense for the most important target areas in the USSR.

66. As a measure of Soviet capabilities and willingness to commit resources, we have examined major weapon programs of the past. For example, were the Soviets to undertake a high priority ABM deployment program to which they committed resources at a rate comparable to the most vigorous programs of the

past, they would expend over an eight-year period about 5 billion rubles (the equivalent of about $9 billion).[8] If construction began about 1971, such a deployment program based on the follow-on ABM system under development would provide some 500-700 launchers by the end of the period of this estimate. This would be sufficient to provide some defense for most of the western USSR and a few other critical target areas. The Soviets are capable of deploying a larger number over the next 10 years, but considering economic and technical factors, as well as their other military requirements, we think it unlikely that they will do so. Toward the end of the period they may begin to supplement their long-range defenses with a short-range, terminal intercept system.

IV. SPACE SURVEILLANCE AND ANTI-SATELLITE DEFENSE

67. Since 1962, the Soviets have been building an elaborate space surveillance system based upon Hen House radars. When completed this surveillance system will provide virtually horizon-to-horizon coverage. It will provide the Soviets with the capability for rapidly detecting and determining the orbits of virtually all satellites crossing the USSR. These radars will probably be capable of detection and tracking out to about 2,000 n.m.; against a near-earth orbiting satellite (at 100 n.m. altitude), detection range would be limited by radar horizon to about 800 n.m. The system is apparently not deployed so as to achieve first orbit detection of all new objects, but most high inclination satellites would be detected on early passes over the USSR. If, as appears likely, the individual radars are netted so that tracking data can be integrated, the Hen House/Dog House network will be able to provide extremely accurate prediction of satellite position after several tracking passes, which would permit intercept attempts.

68. Using existing radars and missiles, the Soviets could now have a limited anti-satellite capability; they could almost certainly destroy or neutralize US satellites in near-earth orbit during an early phase of their mission—i.e., after the first few orbits but before the end of the first day. For the direct ascent mode, the most likely interceptor against satellites in near-earth orbits would be the modified Galosh. Equipped with a nuclear warhead, it would have a high kill probability. With its terminal guidance it could probably use a non-nuclear warhead to neutralize a satellite. Against higher altitude satellites (out to about 2,000 n.m.), the Soviets could use currently operational ballistic missiles or space launchers as interceptors; armed with nuclear warheads, these would have a high kill probability. The Soviets, however, are probably concerned primarily with satellites in near-earth orbit.

69. The Soviets may be developing a co-orbital anti-satellite system. Since October 1967, they have launched several maneuverable satellites. This program

[8] The prolonged (11-year) SA-2 procurement program, which went through several phases of equipment modification, cost marginally more; in the first eight years of its deployment, it cost less than four billion rubles.

could have a number of objectives, but one phase (involving Cosmos 248, 249, and 252) was apparently directed toward developing a capability to pass near a non-co-operating or passive target. Neither inspection nor destruction activity was specifically identified. Nevertheless, this operation, which included close fly-bys at a high relative velocity, seems more applicable to an anti-satellite mission than any other. With currently operational radars and the maneuverable satellite system, the Soviets could probably perform selected intercepts of US satellites now, although a fully operational capability for inspection or interference would not be likely before 1971. If such a capability is a Soviet objective, we would expect to see further testing.

70. The Soviet ability to interfere with satellites in highly elliptical orbits or at synchronous altitude (19,300 n.m.) is much more limited. The Soviets can probably acquire and track such satellites by using their deep space tracking facilities. It is possible that the Soviets could neutralize or destroy such satellites with a nuclear weapon, but such action would require a costly and complex space operation. We believe, therefore, that if the Soviets seek to interfere with the operation of satellites in highly elliptical orbits or at synchronous altitudes, they will use some other means.

71. Soviet technical capabilities are such that they could develop and deploy during the next 10 years any of several types of anti-satellite systems if they chose to do so. They could develop 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 anti-satellite role. They could be exploring techniques (e.g., using lasers or electronic interference) for the non-destructive neutralization of satellites. These techniques might utilize mechanisms on the ground, in the air, or in space.

72. We believe, however, that the Soviets would realize that any use of anti-satellite systems in peacetime would risk opening their own military support systems to retaliation. They probably would attempt to retaliate against our satellites if they believed that we were interfering with theirs. It is also possible that they would attempt to neutralize US military support systems if they thought that war with the US was imminent. But they would probably judge that such action would be regarded by the US as part of a more general attack, and we doubt that they would undertake such an effort prior to the initiation of hostilities.

V. CIVIL DEFENSE

73. 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 military staff officers for the day-to-day operation and co-ordination of the program. Staff officers are assigned to all levels of the Soviet Government. All

or most of these staff officers are active duty military personnel; operational civil defense units are manned largely by civilians.

74. A key part of the civil defense effort is training. Selected personnel are groomed for roles as commanders, specialists, and instructors in the civil defense system. The general population is instructed in weapons effects, and in evacuation, postattack recovery, and shelter construction techniques. No other country has informed its people as thoroughly on the effects of nuclear, biological, and chemical weapons. Soviet citizens now are engaged in the sixth compulsory civil defense instruction program since 1955, and civil defense has become a required subject in elementary and secondary schools throughout the country. Workers are also participating in compulsory training. An extensive network of staff schools trains leaders for civil defense duties. The effect of all this indoctrination cannot be measured, but its pervasiveness has probably conditioned most of the populace to follow orders and take self-help measures in an emergency.

75. The Soviet concept of civil defense calls for mass evacuation of urban areas before an attack. Blast-resistant shelter is scarce and is considered too expensive to build on a large scale, although some shelter construction is continuing. The concept of evacuation presupposes adequate advance warning during a period of rising tension or non-nuclear war. Key personnel and workers on shift in important industries and services would, however, remain in place, and Soviet civil defense officials have claimed that some hardened shelters are being provided for them. The evacuees would disperse into the countryside by every means of transport available. Extensive plans have been made to handle the logistics of this operation and some evacuation and dispersal exercises of limited scope and participation have been reported. However, while the Soviets do have the capability to evacuate a portion of their urban population in a short period of time, the feasibility of an expeditious wholesale evacuation remains questionable. Transportation could be a particularly acute problem because of competing military needs and inadequate facilities. Even if the urban dwellers were successfully evacuated, the problems of providing fallout shelter, food, and medical services for them would remain. Soviet civil defense literature devotes much attention to techniques for building earth-covered trenches, suggesting that the Soviets intend to rely heavily on this kind of last-minute preparation. There is little evidence that materials have been stockpiled in the countryside for shelter construction.

76. Rural participation in the Soviet civil defense program has long lagged behind that of the cities and industrial enterprises. However, over the past two years the Soviets have stepped up their efforts to improve the civil defense knowledge and capabilities of the rural population. During 1968 and 1969, all rural rayons have been required to establish demonstration courses and methodological centers for civil defense training. During this same period, there has been a marked increase in rural civil defense propaganda, seminars, training sessions,

and practical exercises. These activities have covered aid to urban evacuees, preparation of fallout shelter, and protection of water supplies, crops, and livestock from the effects of nuclear attack.

77. Improvements in civil defense preparedness are being advocated by high levels of the party, government, and the military, and there seems to have been some increase in the amount of resources being made available. In addition, civil defense staffs appear to be exerting greater pressures on local administrators and factory and farm managers to force them to act on their legal responsibilities for planning shelter spaces, securing stocks of emergency supplies and equipment, and for organizing and equipping operational units. Some footdragging, however, continues in implementing civil defense measures in industry and rural areas, and among the general public civil defense encounters little enthusiasm. Nevertheless, the unusual public endorsement of civil defense efforts by Brezhnev at the 23rd Party Congress indicates a renewed emphasis on civil defense. Since then, there has been a general rise in the level of civil defense activity in the USSR.

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