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Special Defense Intelligence Estimate

Prospects for the Soviet Union's Airborne Warning and Control System (SUAWACS) (U)

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SPECIAL DEFENSE INTELLIGENCE ESTIMATE

PROSPECTS FOR THE SOVIET UNION'S AIRBORNE WARNING AND CONTROL SYSTEM (SUAWACS) (U)

This estimate has been coordinated with the Intelligence Chiefs of the Army, Navy, and Air Force. All concur in the estimate as written.

APPROVED BY:

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Prospects for the Soviet Union's Airborne Warning and Control System (SUAWACS)

This estimate provides background discussions and long-range judgments regarding the Soviet Union's Airborne Warning and Control System aircraft and their operations. The estimate is primarily intended for use in support of US studies and acquisition programs, notably those dealing with a new US bomber and with countermeasures to the SUAWACS. (U)

Summary

(S/NOFORN) The Soviets are progressing in their attempt to acquire a true AWACS capability. The USSR has now advanced from the TU-126/MOSS, which has serious shortcomings, to the Modified MOSS, which is presently flight-testing upgraded avionics. The CANDID AWACS, expected to reach initial operational capability (IOC) in 1983, ultimately is expected to provide the Soviets with an all-purpose, overland and overwater strategic defense and theater operations support capability. On the basis of preliminary assessments, we believe it will be able to detect and track bomber-size targets to the radar horizon and to detect and track low-altitude, cruise-missile-size (0.1m^2) targets operating over land to 130 km. We estimate the system will be able to process up to 50 targets and conduct multiple simultaneous intercepts. Time on station will be about 6 hours unrefueled, and 15 hours with one refueling for an 800-nm-radius mission.

(S/NOFORN) Perceived Soviet requirements for an airframe better suited for the AWACS mission than CANDID, as well as for improvements in AWACS-related subsystems, lead us to project a Follow-on AWACS, possibly a modified CAMBER, for the 1990s. Detection and tracking capability will be improved--perhaps out to 250 km against low-altitude, cruise-missile-size targets. Target handling and simultaneous intercepts will be increased. The system will have 360-degree coverage and longer time on station.

(S/NOFORN) Data-link controls and satellite communications are expected to facilitate employment of Soviet resources, including AWACS, in future crises. By the mid-1990s, with some 60 CANDID and 20 Follow-on AWACS, the Soviet AWACS fleet is expected to possess a radar capability to detect and track low-altitude, cruise-missile-size targets out to 250 km.

(S/NOFORN) We believe the Soviets will consider the AWACS to be a valuable, but vulnerable, asset. Consequently, the CANDID AWACS and Follow-on AWACS can be expected to employ self-protection avionics and possibly decoys. The Soviets may also perceive a requirement to arm the AWACS in certain environments.

Note: Comments or questions [redacted] should be referred to [redacted] DSARC/Long Range Forecasting Division, Directorate [redacted]

(S/NOFORN) During the next 20 years, the Soviets are expected to increase the size of their AWACS fleet as well as to improve significantly the capabilities of the aircraft within the fleet. Soviet perception of the future threat as characterized by large numbers of small-size cruise missiles, high-speed attack weapons, and penetrating bombers will possibly lead them to build a large AWACS fleet, perhaps 100 aircraft by the end of the century. This force would complement ground-based capabilities and be integrated into the USSR's air defense command-and-control system. The AWACS-led defense against mass aerodynamic threats is expected to concentrate on overwater, and later overland, approaches to the European USSR. We do not believe, however, that the Soviets will attempt to provide AWACS coverage of their entire national periphery.

Discussion

1. (S/NOFORN) The Soviet Union has been involved in Airborne Warning and Control System aircraft development since at least the mid-1960s. Moscow considers the AWACS a strategic asset and has assigned all AWACS aircraft to the National Air Defense Forces (PVO Strany).* The primary AWACS mission is defense of national airspace against massed bomber and cruise missile attacks. The second most important expected mission is battlefield support of Front air operations.

2. (S) As an airborne air battle command post, the AWACS would enhance command flexibility and responsiveness in both strategic and tactical applications. As a situation and intelligence synthesizer, the AWACS would contribute to the success of a ground-based authority in planning and executing operations. The Siauliai unit, home of the MOSS AWACS, is viewed by the Soviets as an experimental squadron which has an inherent operational capability for use in time of war. Its peacetime employment has been exploratory in tactics, equipment, and operations. A full AWACS operational capability can be obtained only with mass production, deployment, and routine daily operations.

3. (S) The Soviet concept of operations for their AWACS fleet will probably involve transient orbit manning. This means all potential orbits will not be manned at all times. Approaches to European USSR through the northern, Baltic, and southern littorals, as well as the Pacific maritime approaches to the Vladivostok and Petropavlovsk areas, would be critical areas for national defense. In the secondary-mission area of theater support, central European and Chinese border regions would be paramount.

* PVO Strany has recently absorbed the national staff of PVO Sukhoputnykh Voysk (Air Defense of the Ground Forces); other changes have also occurred. Voyska PVO is the title for the new organization and is best rendered as "Troops of National and Ground Forces Air Defense."

The MOSS AWACS and Its Follow-Ons

4. (S) The TU-126/MOSS is the first Soviet aircraft used to perform airborne warning and intercept control. Essentially an early warning aircraft, MOSS has a limited capability using voice communications to vector interceptors. Its FLAT JACK radar is not assessed to have a height-finding capability. The radar can detect and track targets at medium to high altitude, but at low altitudes and in radar clutter is effective only against large targets. The assessed detection ranges of the FLAT JACK radar, operating at a frequency of 880 MHz against high-flying targets, vary from about 40 km for a radar-cross section (RCS) value of 0.01 m^2, to about 230 km for 10 m^2 RCS. Higher ranges against larger targets are possible to the maximum unambiguous range.

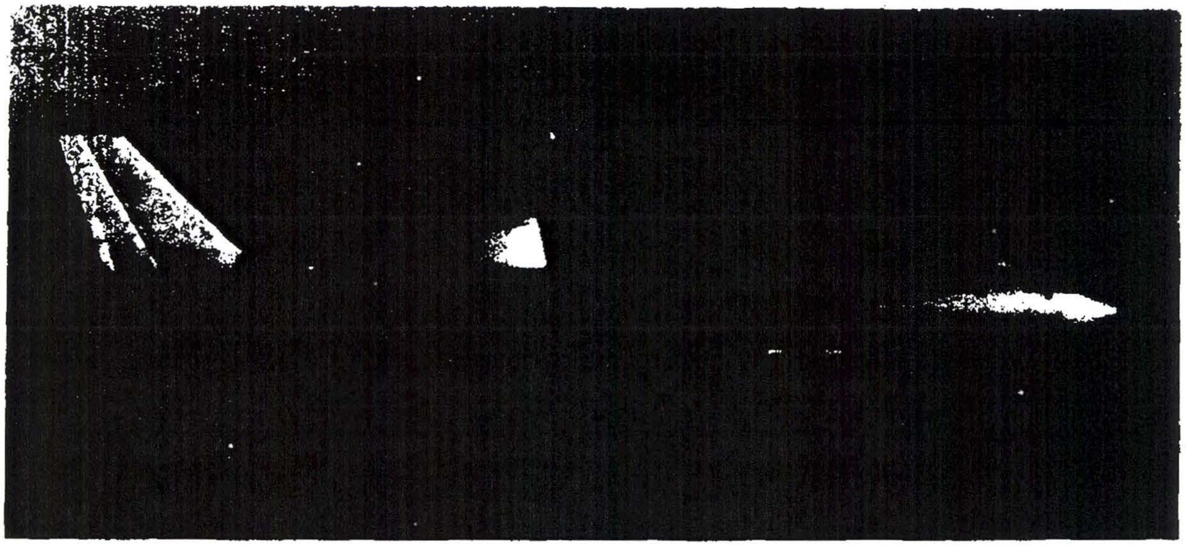

Figure 1. (U) MOSS AWACS

5. (S) All nine MOSS are based at Siauliai Airfield in the Minsk Air Defense District of the Soviet Union and have periodically deployed to Olenegorsk Airfield on the Kola Peninsula for overwater exercises and training operations. With a radius of 800 nm, MOSS has an unrefueled on-station time of 7.2 hours.

6. (C) The three onboard operators, are responsible for identifying and tracking targets, extracting and forwarding data to the automatic control system, and directing fighters for interceptions. The levels of proficiency expected for the average operator are simultaneous direction of three to seven intercepts and simultaneous tracking of six targets. A trained operator should be able to identify about nine targets per minute. This level of activity would require a "loose" control--i.e., general vectoring of the interceptor by the Air Combat Intercept (ACI) operators--as opposed to a "tight" control (i.e., control by the ACI operator until actual weapons release).

7. (S) ECM systems on the MOSS provide long-range jamming of surface-based air surveillance radars, self-protection in the rear hemisphere against fighters equipped with I-band airborne intercept (AI) radar, defense against surface-based fire-control systems in the forward hemisphere, and jamming against some types of early warning radars and possibly against ground-to-air and air-to-air communications in the VHF/UHF bands. In addition to active jamming, a MOSS aircraft employs four semiautomatic electromechanical chaff dispensers. These are believed to be the self-protection, chaff-release systems used on nearly all Soviet medium and heavy military aircraft.

8. (S) Equipping of MOSS with AI and surface-threat radar-jamming capabilities indicates that the potential for battlefield employment was recognized early in the AWACS program and reflects Soviet plans to have AWACS prepared to support Front operations. Lack of an overland capability in the FLAT JACK radar, however, has precluded experimentation in this secondary role.

9. (S) MOSS performance deficiencies in radar and C^3 capabilities have not dampened the Soviet commitment to the AWACS concept. Lack of a look-down capability is the most important deficiency. Detection ranges against small RCS targets need improvement. Consequently, the MOSS is little more than an early-warning platform which can, through voice communications, vector fighters or flights of fighters.

25X1, E.O.13526

Modified MOSS 25X1, E.O.13526

10. (S/[redacted]NOFORN) At the Taganrog airframe plant, the Soviets have modified a MOSS with a new radar, new rotodome, and a blister on top of the fuselage. The functions of the blister are not certain, but it may be an antenna for communication by satellite with ground-based command-and-control centers. The new rotodome is significantly different from the one on the standard MOSS. It is smaller in diameter and appears similar in construction to the rotodome on the E-3A AWACS aircraft. The Modified MOSS, which has been active in flight operations since at least 1978, has been integrated back into the unit at Siauliai. [redacted] 25X1, E.O.13526 Thus, the Modified MOSS is probably serving as a testbed for equipment and procedures intended for eventual use on the CANDID AWACS. We must, however, recognize the possibility that the Modified MOSS has a unique radar system as compared to the CANDID AWACS and that additional MOSS may be converted to use this radar.

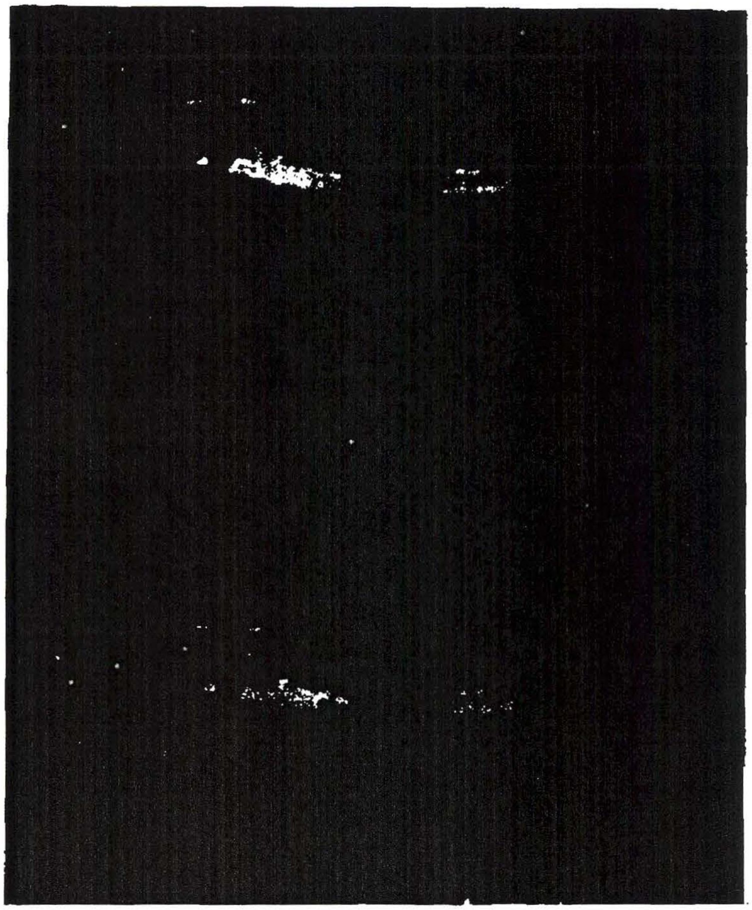

Figure 3. (U) CANDID AWACS

CANDID AWACS

11. (~~S~~/NOFORN) At least two CANDID airframes have been modified as AWACS platforms. The rotodome of the CANDID is the same size and construction as the one on the Modified MOSS, indicating the radar antenna and probably the radar itself are similar. The geometry of the CANDID airframe and rotodome allows a somewhat better low-altitude radar coverage pattern than that of the Modified MOSS. An important question is the ability of the new radar to determine target altitude and to detect low-flying targets. There are three possible techniques to achieve this capability: a radar with a phased-planar array antenna with electronic steering (at least in the elevation plane); multiple-elevation beams; or measurement of time-difference-of-arrival for primary target returns and multipath. We have as yet no indication which method is being used. This system probably will have an ACI capability and new data links for ground-to-air, air-to-air, and air-to-ground communications. Such links are needed to take full advantage of the AWACS surveillance capability and air-battle-management potential. Both ground-to-air and air-to-ground links would facilitate the correlation of airborne and ground-based radar data. The air-to-air link would permit the vectoring and control of interceptors when required. These links are also necessary to take full advantage of the long-range, multiple-target, look-down/shoot-down capability of the Modified FOXBAT, which is expected to reach IOC in the early 1980s. The Soviets are also likely to integrate a satellite relay into their communication system to serve higher authorities.

12. (~~S~~/NOFORN) The postulated ECM complement for CANDID AWACS would provide for ground-based and airborne threats. The CANDID AWACS is expected to have a jammer for use against air-surveillance radars. Tail-defense systems would include noise and repeater jammers against AI radars. In the forward hemisphere we would expect jammers for surface threat radars and possibly VHF/UHF communications jammers. In addition, self-protection chaff and IR countermeasures equipment are expected.

13. (~~S~~) We know little about the type of on-board computer processing on the CANDID AWACS, although it is expected to be digital. In all probability, the system will be able to handle multiple-target tracks, perform some type of track prediction, and provide interface capability with both ground sites and interceptors. As is the case with the computer, nothing specific is known about the data display. In general, expected characteristics include synthetic video, track numbers, and other identification notation visible to the operators; selective target allocation to different operators; and local, area, and multiple-scope displays.

14. (~~S~~) The new Soviet AWACS, which is projected to reach IOC in 1983, could be used in conjunction with any of the fighters in the Soviet inventory at the time of its deployment. However, it would be most effective against low-altitude targets if used with projected Soviet fighters such as the Modified FOXBAT, New Sukhoy Fighter, New Mikoyan fighter, and Long Range Interceptor (LRI) that are expected to have a look-down/shoot-down capability. Other interceptors likely to work with an AWACS include FLAGON F, the Retrofit FOXBAT A, and FLOGGER B/G. (See Table I, Fighter Aircraft Performance (U)).

TABLE I

ESTIMATED CHARACTERISTICS OF SOVIET AIR DEFENSE AIRCRAFT

Current	IOC	Armament	Combat Radius and Mission Time a/ wo/w ext fuel tks (nm) (hr) H-Alt Combat	L-Alt Combat	Radar Search/Track Ranges (km) b/ H-Alt Target	L-Alt Target
SU-15/FLAGON E/F Med-to-High Alt	1973-1975	4 missiles	510/600 (2.0)(2.4)	430/530 (1.7)(2.1)	65/50	Not capable
MiG-25/FOXBAT A Med-to-High Alt	1970	4 missiles	590/785 (2.4)(3.1)	535/730 (2.3)(3.0)	100/75	Not capable
MiG-25/FOXBAT A - Retrofit Low-to-High Alt	1980	4 missiles	590/785 (2.4)(3.1)	535/730 (2.3)(3.0)	120/80	40/40
MiG-23/FLOGGER B Low-to-Med Alt	1972	6 Missiles + gun	535/710 (2.5)(3.2)	405/585 (1.4)(2.7)	90/60	30/30
MiG-23/FLOGGER G Low-to-Med Alt	1978	6 missiles + gun	535/710 (2.5)(3.2)	405/585 (1.4)(2.7)	120/80	40/40
Under Development						
MiG-25/Modified FOXBAT Low-to-High Alt	1981	8 missiles + gun	900/1025 (3.6)(4.1)	800/925 (3.2)(3.7)	260/250	260/250
New Sukhoy Ftr Low-to-Med Alt	1984	6 missiles + gun	490/770 (2.0)(3.1)	345/630 (1.4)(2.6)	130/100	130/100
New Mikoyan Fighter Low-to-Med Alt	1984	4 missiles + gun	485/590 (2.0)(2.4)	350/455 (1.5)(1.9)	130/100	130/100
Projected						
Long Range c/ Interceptor (LRI) Low-to-High Alt	1989-1991	6 missiles	1,900/-- (8.7)(--)	1,800/-- (8.6)(--)	300/250	300/250

a/ The combat radius data presented are based on an optimum mission profile flown at subsonic speeds and medium-to-high altitudes.

b/ Radar search (detection) and track ranges presented for current interceptors are assessed radar scope limits. Ranges presented for interceptors under development and projected for development are estimated values based on a fighter-sized target with a radar cross section of 10-square meters.

c/ The long-range interceptor-design mission is based on a requirement for sustained operations 1,000 nm from base and includes 2.25-hours loiter.

15. (S) An operational deficiency of the CANDID AWACS comes from its high T-tail configuration which interferes with radar coverage over a 40-degree sector to the rear of the aircraft. This affects the employment of CANDID AWACS. A single aircraft on station must always maneuver to keep the air battle or threat within the radar coverage area. An "orbit" cannot therefore be a matter of all right-hand or left-hand turns but, instead, an "S" pattern with the AWACS always turning toward the threat. For multiaircraft contiguous patrols, the loss of rear hemisphere coverage means that orbits must be more closely spaced, and perhaps synchronized. Consequently, the CANDID AWACS is better suited for a standoff application, such as behind the FEBA in a tactical battlefield application, than it is for barrier duty, where the threat will be passing through the patrol zone. Other deficiencies of the CANDID include less-than-optimal internal space for equipment and crew and limited on-station endurance, estimated to be 6.3 hours unrefueled for an 800-nm-radius mission.

Air Defense Operations

16. (S) The General Staff, probably through the Troops of National and Ground Forces Air Defense Headquarters, would allocate AWACS resources according to availability and needs. AWACS employment would include homeland air defense, theater war in Europe or the Far East, and, eventually, air surveillance support of power-projection operations abroad. We believe the Soviets will use AWACS in support of a fraternal ally only when risk to the platform is very low.

17. (S) Resources permitting, air defense operations will be conducted on the most probable avenues of enemy approach, with air defense fronts or armies formed to combat air threats. The general tactic is one of attrition in depth, beginning with forward fighters and coastal SAM barriers, followed by further fighter zones, and finally terminal defenses. But AWACS patrol zones are not projected to be established as a homogeneous barrier encircling the USSR. The requisite number of AWACS platforms is too great, there are insufficient numbers of peripheral interceptor regiments, and complementary air defense capabilities are inadequate in some eastern regions. Instead, as in theater war, we believe the AWACS will be deployed to cover the expected axes of major ground and air operations to priority targets. A national defense problem for the 1990s will be extending and supporting forward defenses to defeat airborne, cruise-missile launch platforms.

18. (S) An essential element in AWACS operations is interceptor support. Current basing presents an unbroken crescent of fighter bases extending along the northeastern periphery from Amderma to the Kola Peninsula to Kaliningrad. On the southeastern periphery, interceptor basing is regularly spaced from Odessa, across the Black and Caspian Seas, to Tashkent. These bases are best situated to support a contiguous, sustained, AWACS-controlled interceptor barrier. Bases along the Sino-Soviet border and in most of the Far East are sparsely situated and can therefore support only limited AWACS orbits. An AWACS defense would not be sustainable around the Siberian periphery without provision of significant additional fighter bases. Much of the eastern air defense battle is expected to be fought over the Siberian Landmass.

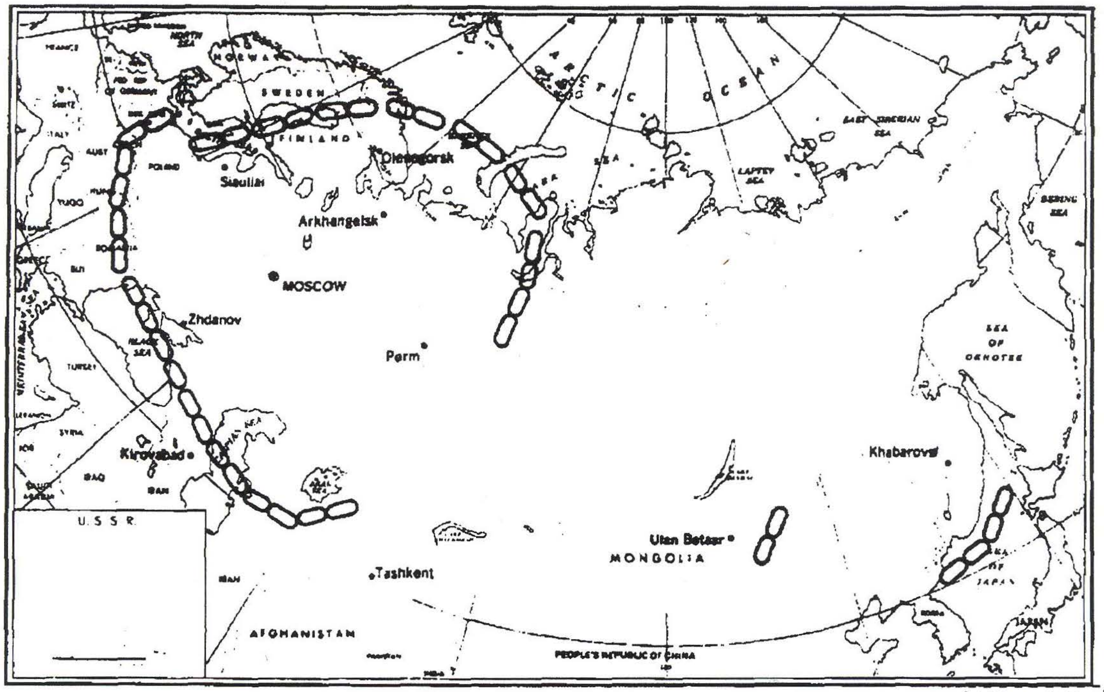

Figure 4. (U) Possible AWACS Support Bases and Patrol Zones

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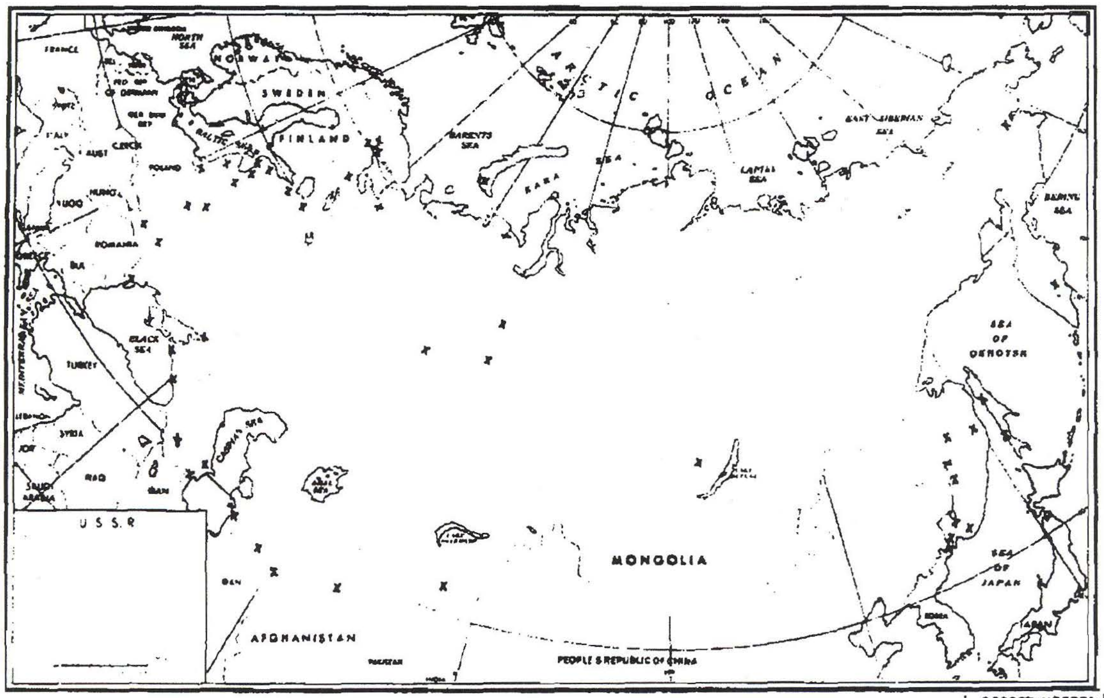

Figure 5. (U) Peripheral Fighter/Interceptor Bases

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19. (S) The CANDID AWACS will become the central element in the air defense battle. The ability of the CANDID AWACS to conduct semiautonomous operations derives from its capacity to vector fighters or groups of fighters against multiple targets. CANDID AWACS operations are expected to be integrated into the national air defense command and control system. Patrol zones are likely to be contiguous to areas of good GCI radar coverage to facilitate placing continuous pressure upon an attacking force. Initial AWACS operations are expected to be over water, but, with improvements in technique, experience, and numbers, AWACS patrols will be standardized over land as well.

20. (S) In establishing the areas of principal AWACS operations, Soviet planners might use orbits some 120- to 140-nautical miles long, with about 100-nautical miles separation. Operational altitudes are expected to be 8,000 to 10,000 m. Two to four aircraft would be assigned per orbit for sustained operations; a lesser number would satisfy a surge requirement. A single crew could probably perform continuously for about 8 hours on station before operational efficiency is degraded by fatigue. Alternatively, with two crews on board and with air-to-air refueling, 12 hours on station would be highly feasible. In either case, operator fatigue must be considered along with aircraft, fuel, and oil endurance as a limiting factor in planning operations. A platform's surplus technical capability beyond the normal crew physiological limits may be useful in flight between base and distant patrol areas when full crew activity is not required. The Soviet AWACS design requirement would probably call for an on-station time of 12 hours unrefueled.

21. (S) The AWACS may function as an active source and relay for general air battle information for the ground-based command authority. A principal function would probably be that of conducting air intercept operations. In the near term, the kind of direction given the fighters is expected to be general or zonal. In low-intensity battles or in more advanced AWACS, air intercept instruction will probably become more discrete and specific, except possibly when directing Modified FOXBAT-type aircraft in strategic defense operations.

22. (S/NOFORN) In addition to its primary air intercept role, the Modified FOXBAT possibly has a secondary command-and-control function as a limited-airborne surveillance system. Its look-down radar is assessed to have a multiple-target-tracking capability, and the aircraft may have voice or data-link channels to direct the intercept actions of other fighters. The Modified FOXBAT in this role could perform as an airborne regimental-level control, directing and monitoring flights of interceptors against aerodynamic intruders. Supported by an estimated fighter-to-fighter data link, this intraregimental control would imply lessened AWACS control once contact is established. A future growth application of this Modified FOXBAT capability would be in mixed-formation tactics where one Modified FOXBAT might direct a flight of interceptors with less radar capability, much as US F-105s teamed up with RB-66 aircraft for blind-radar bombing in Vietnam. Using its superior target-tracking ability and its data-link system for control, the Modified FOXBAT could vector FLAGONs or FLOGGERs with modified data links and appropriate computer interfacing--for example, until their missiles were expended--then commit its own weapons as needed.

23. (S/NOFORN) Yet another tactic is the use of the Modified FOXBAT in a target-following role, especially for low-altitude targets. In this case, the onboard look-down radar characteristics would complement ground-based systems by providing continuous track information via data-link through coverage gaps and clutter areas. The widespread application of data-links would greatly enhance the lethality of currently fielded systems without greatly stressing other technology advances. As the 1980s are expected to be the decade of the assimilation of look-down/shoot-down technology by air defense aviation, the 1990s could see the data-net interlinking of AWACS platforms, ground-based radars, interceptors, and SAMs on a force-wide basis. (See Figure 6. Possible Engagement Scenario (U))

24. (S) Although equipped with some self-protection devices, AWACS is an exposed and vulnerable platform. Its value increases with the intensity of the air defense operation and the degree of reliance placed upon it. The essential functions to be preserved are surveillance and communications. To preserve these functions, altitude-change maneuvers may be required to avert certain dangers. Temporary operations as low as 3,000 m may be expected. Fighter cover is likely to be assigned and dedicated solely to the defense of AWACS against severe, proximate threats. Electronic counter-countermeasures (ECCM) features will be incorporated into current and future radar designs. [redacted] 25X1, E.O.13526 ECM and IR countermeasures and decoys are expected.

Tactical Battlefield AWACS

25. (S) The Soviets have foreseen a need for an AWACS in a tactical battlefield situation. In the European theater especially, the combat situation is likely to be complex and rapidly evolving, requiring the larger, integrated-air-situation capability of an AWACS. Soviet experience with airborne reconnaissance has already indicated a strong need for real-time coverage over broad areas. An overland-capable AWACS can provide real-time processing and large-scale integration functions.

26. (S) The mission of a Soviet tactical AWACS would be collecting and communicating air battle data and the efficient application of fighter assets in escort and counterair roles. The establishment of an environment for air battle management is accomplished through extending the zone of air control to facilitate the operation of air warfare assets over hostile territory. Enroute strike guidance to low-altitude aircraft outside the range of navigation emitters, intercept vectors to the target, as well as threat information, are unique battlefield AWACS functions. Front air defense support operations are also enhanced by AWACS participation. Specific offensive AWACS applications indicated in Soviet writings include air surveillance, the "isolation of the battlefield" (i.e., limited air supremacy operations), close air support, air interdiction, airborne landings, and airlift operations.

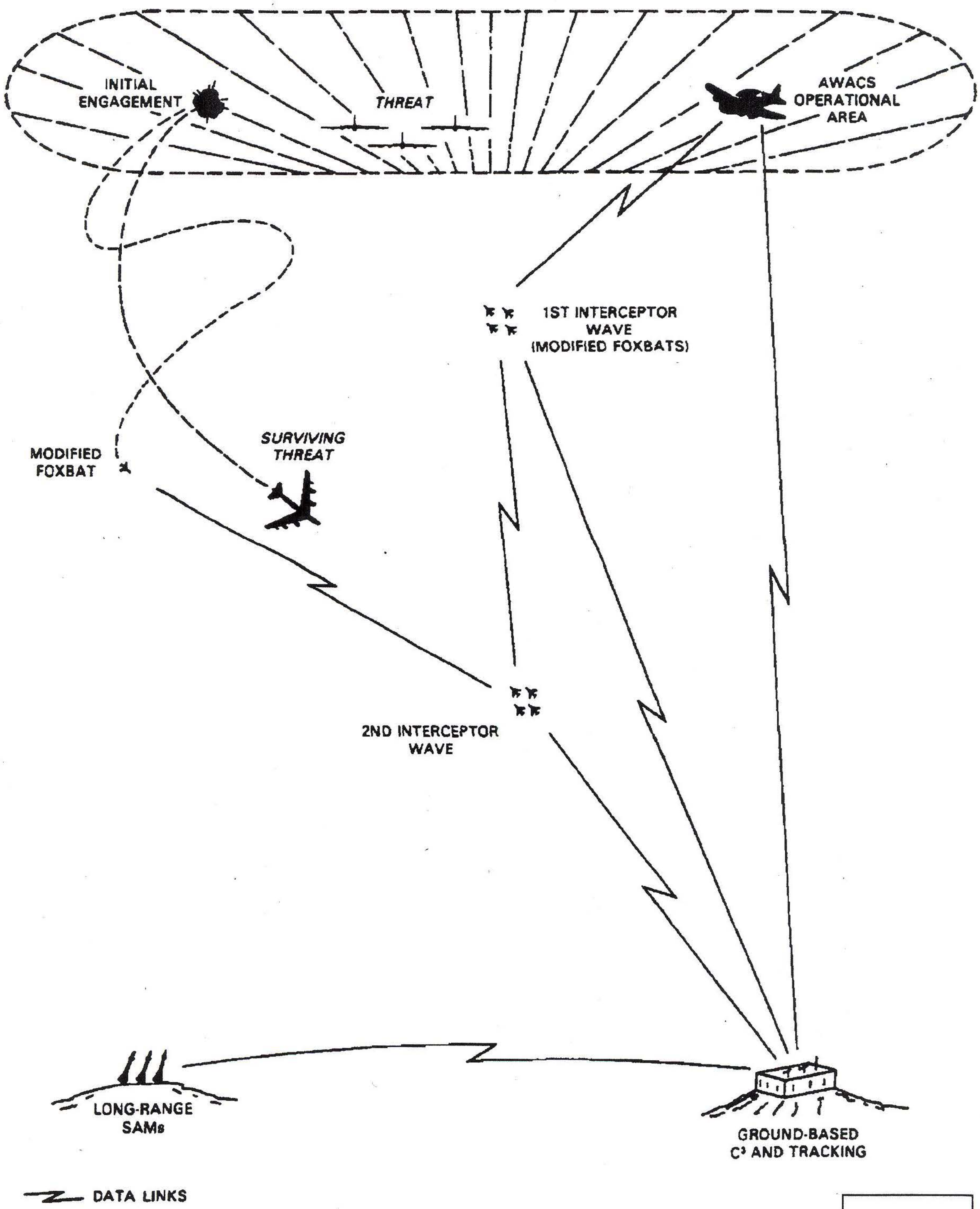

Figure 6. (U) Possible Engagement Scenario

27. (S) Soviet doctrinal emphasis on combined-arms combat stresses the integration of aviation with the conduct of ground operations. With advances, probably by the late 1980s to early 1990s, in signal processing to allow detection of moving ground targets, we believe a Soviet tactical AWACS would also likely be used for limited battlefield ground-force surveillance where circumstances permit. Carrying encoded beacon transponders could permit monitoring the movements of friendly troop formations. Otherwise, ground resolution of the AWACS radar is not expected to be sufficient to detect individual pieces of equipment. Another battlefield use would be passive search wherein the AWACS would not radiate but instead would monitor airborne radar and IFF as well as ground-based threat radars and jammers. We believe the AWACS will possibly be equipped with an IFF jammer for tactical employment.

28. (S) In open source literature, the Soviets have expressed an interest in multistatic, or "diverse," radar operations in which one transmitter may be synchronized with other receive-only radars. A tactical innovation which could yield significant advantages is the adaptation of bistatic operations between SUAWACS pairs. Through digital coding of the transmitted signal, computer processing is enhanced; forward-scatter radar energy received and decoded by a second AWACS would provide additional detection and tracking information, especially against small RCS, low-altitude targets. Technical difficulties, however, are formidable in airborne bistatic operations but such operations have been proven feasible. Bistatic operations against a noncooperating AWACS would be even more difficult.

29. (S) The principal commanders with which the tactical AWACS would interact are the air and air defense authorities at the front. Army- and division-level headquarters may also be provided with the capability to monitor air or ground battle developments. The AWACS is expected to have an up-link satellite capability to relay battle information to higher echelons, such as a theater of military operations (TVD) and national authorities. This projected facility would enhance General Staff assessment and control of inter- and intra-theater developments.

Naval Applications

30. (S) Operational requirements for naval applications include support of surface units at sea as well as in port. The latter function would be subsumed under homeland air defense. Fleet units operating in peripheral offshore areas, particularly those units with SAM capability, could coordinate their air defense efforts with land-based air defense forces. Shipboard fighter controllers may augment AWACS controllers in meeting local air threats and in defending the AWACS platform itself.

31. (S) Support of distantly deployed naval forces will be limited to areas within SUAWACS radius of action (about 1,000 nm for CANDID) from land bases, which need not necessarily be limited to the Soviet Union. Within these areas, AWACS could support such functions as antiship-missile defense/antiair warfare (ASMD/AAW), over-the-horizon targetting for antiship cruise missile systems, and carrier-based antisurface warfare (ASUW). However, this will not fulfill all naval air surveillance needs.

32. (S) We believe a naval Airborne Early Warning (AEW) aircraft will be developed for the Soviet CTOL aircraft carrier, expected to become operational in the late 1980s. A radar with a primary frequency capability in the L-band (400-1550 MHz) would be desirable, and the projected airframe would likely be similar to the AN-24/COKE or AN-26/CURL. L-band radar performance characteristics, which suggest its use in a naval environment, include enhanced detection ranges against small RCS targets, degradation of radar attenuation treatments, and atmospheric ducting for over-the-horizon detection. The naval AEW platform would most likely remain dedicated to supporting fleet operations rather than supplementing other AWACS missions.

OUTLOOK

Force Level Projections

33. (S) The AWACS fleet is expected eventually to be at least large enough to provide coverage in the defense of the more vital military and industrial areas of the European USSR under conditions of nuclear war. This requires a force capable of intense, short-duration operations. Two or three platforms per orbit would be adequate, depending upon time-on-station capability and how long continuous operations are required. In the case of conventional war, or increased likelihood of conventional war, additional platforms would be dispatched to provide battlefield support operations on a selected basis depending upon combat emphasis and intelligence needs.

34. (S) Based upon minimal numbers of patrol zones on the European periphery, as few as 35 AWACS could provide a measure of defense in a nuclear conflict. This level would provide two 12-hour-capable AWACS per orbit and handle 15 patrols, with five aircraft available as spares. As this manning leaves serious gaps and creates opportunities for evasion, we expect the Soviets to pursue a more certain defense by expanding the number of patrol zones. Projections of the long-term AWACS force size are extremely tenuous, but a resonable force would eventually cover some 40 orbits, perhaps 6 in the North from Finland to the Yamal Peninsula, 6 in the Baltic area from Poland across Finland, 12 in the South from Odessa to the Aral Sea, 4 interior from Sverdlovsk northward along the Urals, 4 guarding the maritime approaches to Vladivostok, 6 in central Europe, and 2 on the Chinese border. (See Figure 4.) An allowance for programmed maintenance and a slight reserve for priority allocation brings the necessary force size for the end of the century to 100 aircraft. Such a fleet would allow more intensive manning of critical orbits and an expansion of patrol areas.

35. (S) MOSS will probably remain operational into the late 1980s as the Soviets build their AWACS fleet. We expect the CANDID AWACS to reach IOC by 1983. The Soviets will probably field this system about as rapidly as they can, bounded only by an eventual production rate of one CANDID AWACS per month. Our best estimate is for 60 CANDID AWACS to be deployed by 1990.

36. (S) A slower CANDID buildup rate is conceivable and could result from several factors:

a. (S) The AWACS suitability of CANDID is reduced by the system's relatively poor airframe-rotodome geometry, its shortage of internal space for crew and equipment, and its lack of a satisfactory station-keeping endurance.

b. (S) Greater-than-projected demands may occur for CANDID airfarmes as military or civilian transports, as ECM platforms, or as tankers. Hard-currency export sales may also reduce the available pool; there is little slack between existing production capacity and currently projected requirements.

c. (S) The Soviets will continue to seek an AWACS airframe which overcomes CANDID shortcomings. Possible options include building a new aircraft or converting an existing one. The initiation of either of these programs in the mid-to-late 1980s would reduce the overall need for CANDID AWACS deployments.

d. (S) Operations problems, such as recruiting, selecting, and training AWACS crew members, as well as developing and assimilating the experiences of operating large numbers of platforms, may well impact on fleet growth in the late 1980s.

37. (S) We project CAMBER will be adapted as a Follow-on AWACS and reach IOC in 1991, ending CANDID AWACS production. With production of this Follow-on AWACS, about 100 AWACS aircraft would be operational by the late 1990s.

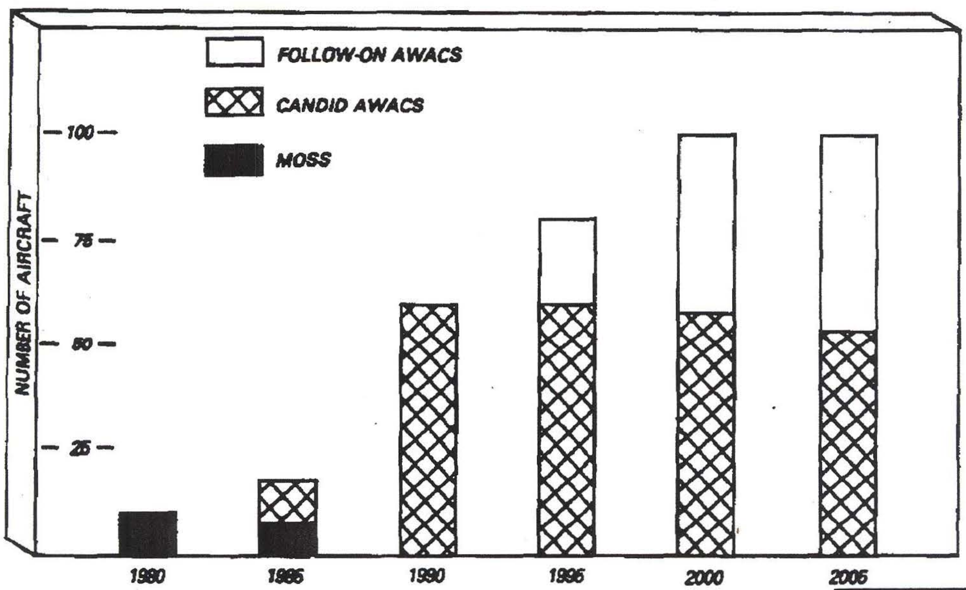

Figure 7. (U) Best Estimate Force Composition

38. ~~(S)~~ The upper bound on this projection, some 150 AWACS, represents the estimated capacity of the Soviet electronics industry to produce reliable AWACS subsystems and avionics. CANDID and CAMBER transport aircraft are currently in production at rates which greatly exceed the projected AWACS fleet growth. Alternatively, Soviet inability to master AWACS avionics production on a moderate scale will force prolongation of the program. In this case, lower numbers may result.

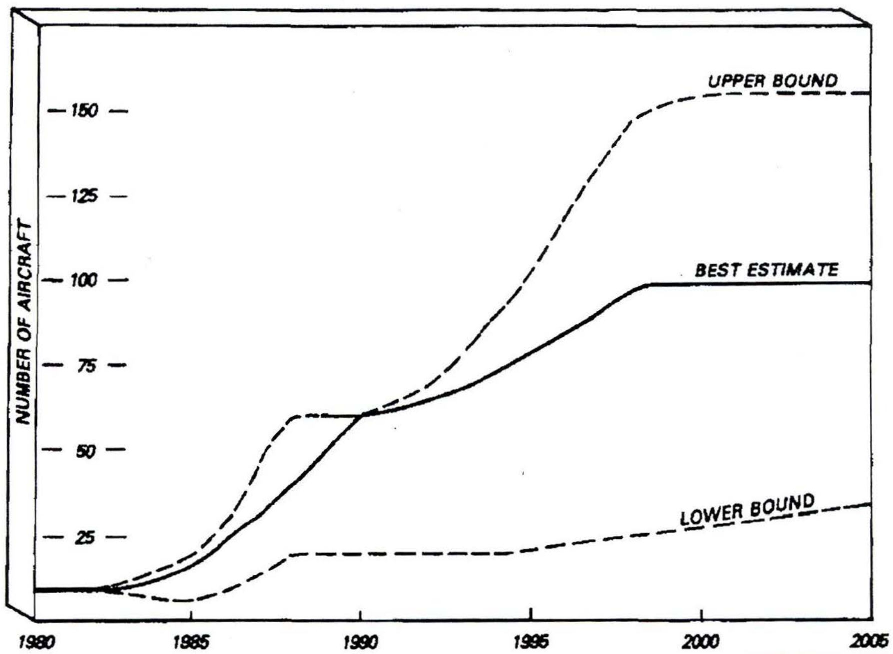

Figure 8. (U) Projected SUAWACS Force Levels

<u>CANDID Improvements and Follow-on AWACS</u>

39. (~~S~~/NOFORN) The estimated CANDID radar performance represents a significant improvement over that of the MOSS/FLAT JACK. We believe it to be potentially capable of detecting and tracking fighter- and bomber-size targets, at medium and high altitudes, out to the radar horizon. Cruise-missile-size targets (0.1m^2) at low altitude may be detectable to 190 km over land and 170 km over water. The CANDID's potential operational radar and processing capabilities have probably not yet been achieved, but we expect the system to demonstrate evolutionary improvements throughout the 1980s. These improvements should lead to even better performance for the Follow-on AWACS. Radar detection of small, low-altitude targets should reach 250 km. Improvements in signal processing could nearly triple the number of targets identified to 150, compared to 50 estimated for CANDID AWACS. (See Table II, Estimated AWACS Radar Performance Characteristics).

40. ~~(S)~~ We project the Soviets will use a new airframe for a Follow-on AWACS. The requirements for longer on-station loiter times and a larger cargo compartment for on-board processing equipment and crew rest area will probably drive the Soviets

TABLE II

Estimated AWACS Radar Performance Characteristics (U)

	MOSS	CANDID	FOLLOW-ON [e]
Radar	FLAT JACK (with parabolic reflector antenna)	Pulse-Doppler (with probable planar phased array system)	Pulse-Doppler (with probable planar phased array system)
Coverage	360°	320°	360°
Look-Down Capability	No	Yes	Yes
Est. No. of Target Tracks Identified	30	50	100-150
Est. No. of Simultaneous Intercepts	3-7	3-16	3-24 (data link control)
Estimated Detection Range (km)			
High Alt Bomber-size Target [a]	415	Radar Horizon [d] (745 km)	Radar Horizon (745 km)
Low Alt Bomber-size Target [b]	175 (overland) 250 (overwater)	Radar Horizon (415 km)	Radar Horizon (415 km)
Low Alt Cruise-Missile-size Traget [c]	No capability	130-170	250

a. AWACS at 8,000 m altitude, target at 9,150 m with an RCS of 100 m^2.
b. AWACS at 8,000 m altitude, target at 100 m with an RCS of 100 m^2.
c. AWACS at 8,000 m altitude, target at 100 m with an RCS of 0.1 m^2.
d. Currently limited to 340 km unambiguous range, but improvements are likely.
e. All characteristics for this system are postulated.

Figure 9. (U) Projected CAMBER AWACS

to a wide-bodied transport equipped with high-bypass-ratio turbofan engines. As suggested previously, the likely candidate is the IL-86/CAMBER. This aircraft became operational in 1981 and has low-fuselage-mounted wings for a potential increased radar look-down angle and a low-tail configuration, which permits 360-degree coverage as compared to 320 degrees for CANDID. In addition, the large internal cargo area would allow for more AWACS-associated equipment (multiple sensors, data processing, etc.) on the aircraft as well as increased crew area. (See Table III, Mission Performance Comparison).

41. (S) A disadvantage of the CAMBER is its low-bypass-ratio turbofan engines, which are relatively heavy and register high fuel consumption. A high-bypass-ratio turbofan engine with improved thrust and 30- to 40-percent improvement in specific fuel consumption could be available for a CAMBER transport by 1986. Should this engine prove reliable and easy to maintain, we believe the Soviets will adapt the CAMBER as a follow-on AWACS by the early 1990s.

Force Capabilities

42. (S/NOFORN) The majority of future interceptors and fighters will be equipped with look-down/shoot-down radar and missile systems. Most of these aircraft also will be equipped with data links allowing automated interaction with AWACS and GCI authorities.

43. (S) The AWACS and interceptor forces of the 1990s should thus be able to engage bombers at all altitudes. Standoff weapons could be engaged at medium to low altitudes while still beyond the national frontier. These engagement capabilities include targets of speeds from subsonic to Mach 2.0 and of various size (RCS values from 0.1 m^2 to 100 m^2).

TABLE III

MISSION PERFORMANCE COMPARISON (U)

Loiter At 800 nm From Base

Altitude 8,000 m

CONDITIONS	MOSS	CANDID	FOLLOW-ON [a]
Takeoff Weight (kg)	174,130	170,000	200,000+
Fuel (kg)	67,000	80,000	93,000
Service Ceiling (m)	10,140	12,300	13,000
Combat Radius (nm)	800	800	800
Loiter speed (kn)	280	295	300
Average speed (kn)	405	380	420
Total mission time (unrefueled) (hr)	11.4	10.3	12+
On-station time (unrefueled) (hr)	7.2	6.3	8+
Total mission time (refueled) (hr)	22.5	18.6	23+
On-station time (refueled) (hr)	18.3	14.6	18+

a. Values are postulated and not based on an engineering analysis

Reactive Changes in AWACS Doctrine

44. (S) The current AWACS concept is predicated upon the perceived threat in terms of technical characteristics, numbers, and radar observables. Emergence in the 1990s of a US stealth bomber and advanced cruise missiles would call for new Soviet tactics and capabilities. A technique applicable to these threats would be the use of multispectral radars to increase effectiveness against RCS reduction and radar absorptive materials (RAM).

45. (S) A decrease in the cruise missile threat, perhaps through arms control, would reduce somewhat the emphasis on AWACS development. An increase in the numbers of penetrating bombers would be met by corresponding increases in the numbers of AWACS, but there may be less need for extended defenses.

46. (S) Anticipation of US strategic standoff weapons, such as an anti-SUAWACS missile, would encourage Soviet development of a capability to detect and warn against such missiles when launched or airborne. Similarly, the Soviets could be expected to pursue the capability to decoy or defeat such US missiles with onboard equipment or tactics. The Soviets are expected to develop active and passive countermeasures as this threat emerges. For inertially guided threats, lethal defensive systems like air-to-air missiles may be suited to the AWACS. For seeker-controlled threats, decoys and jamming systems are expected.

47. (S) An armed SUAWACS would be equipped with current technology systems, including an AI radar, air-to-air missiles, and an early-warning radar. The Modified FOXBAT look-down radar with an enlarged scanner would have better range resolution and target capacity than all current or estimated AI radars. A mix of AA-6 and AA-X-9 air-to-air missiles would yield a good capability against a spectrum of air threats. The early-warning radar system may be an adaptation of that being developed for CANDID, or it may be a new system in L-band, for example. We believe the Soviets will seriously consider this option by the mid-to-late 1980s and by the early 1990s will possibly build a few prototypes to investigate tactical applications and alternative force structures. It is unlikely that the Soviets would arm the AWACS in normal national air defense or theater operations. It is possible, however, that specific applications calling for extending radar coverage where fighter protection is unavailable would result in limited development of this concept.

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