CNO EXECUTIVE PANEL

12/31/80

DOZ

The attached is provided for "ship patrol" use by CNO in the event that the surveillance requirement in the Persian Gulf stretches into the indefinite future -- with attendant high costs in AWACs and Navy protective reaction fighters.

V/R

Jim

DOD

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
CNO EXECUTIVE PANEL
WASHINGTON, D C 20350

SECRET

IN REPLY REFER TO
OP-00K/bab
Ser S1049
24 Dec 1980

SECRET

MEMORANDUM FOR ADMIRAL HAYWARD

Via: CAPT Patton

Subj: Fleet Air Defense of the Arabian Sea Battle Groups Using an Over-the-Horizon (OTH) Radar

Encl: (1) ESD Hanscom AFB Maine 032100Z Dec 80, OTH-B Radar Test Status Report Number Four (U), SECRET
(2) An Over-the-Horizon (OTH) Radar Concept to Support Fleet Air Defense, SECRET

1. (S) An Over-the-Horizon backscatter (OTH-B) radar in the Middle East with coverage from 500 to 1,800 nautical mile ranges spanning a sector from the Soviet Union to the Arabian Sea could relieve the burden on the AWACS aircraft providing fleet early warning to the Battle Groups. The USAF, as part of the North American Air Defense Program, has installed an experimental radar system (ERS) which, if moved to a Middle East location, could provide surveillance of the region of interest. This memorandum addresses the possibility of relocating ERS to a Middle East location in the summer of 1981.

2. (S) The USAF is developing the continental United States (CONUS) air defense system (414L) consisting of overlapping coverage OTH radars installed on the West and East coasts of the United States. The 414L experimental radar system (ERS) has been installed in Maine. ERS has been designed to validate the operational concept, to evaluate and quantify OTH radar performance in the most severe aurora environment, and to determine the statistics of outages. System performance tests began in June 1980 and will be completed in February 1981. Initial operational test and evaluation (IOT&E) will begin in March 1981 and will be completed in May 1981.

3. (S) Enclosure (1), the most recent OTH-B radar test status report on the operational testing of ERS indicates fully routine ERS operations have been achieved. The system software and hardware have matured and are performing close to the intrinsic operational objectives of the system concept. Cooperative ERS/E3A joint reporting and correlation tracking missions to validate ERS resolution performance began on 21 November. Pairs of aircraft at nominal 1,000 nautical mile ranges and 115 nautical miles separation between the aircraft have been located relative to one another and have been tracked with errors of 14 to 24 nautical miles. The Concorde, an aircraft comparable in radar cross section and size to the BACKFIRE bomber, has been tracked routinely at 1,700 nautical mile ranges. Test results have

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established that the ERS system performance testing is validating the operational concept consistently.

4. (S) In May 1980, the Navy concluded a Memorandum of Agreement with the USAF CONUS-B Special Program Office to initiate CHURCH EYE, the Navy's development program to evaluate ERS performance against surface ships. In April 1981, the ERS system contractor, General Electric, Corp., will deliver the ship detection and track software upgrade needed to perform automatic detection and track experiments. When the Air Force completes IOT&E in June 1981, the Navy will perform three months of dual mode (surface ship and aircraft) Wide Area Surveillance and Targeting experiments. By the end of June 1981, with minimum disruption to the Air Force plan and the Navy CHURCH EYE experiments, ERS could be dismantled and installed at a Middle East operating location.

5. (S) Enclosure (2) provides preliminary estimates of the cost and time required to install an ERS at a Middle East location. Four OTH radar system alternatives are listed at the tab to enclosure (2). Alternatives 2 and 3 are 60° and 90° coverage sector automatic scan OTH radar systems, the existing ERS and an extended azimuthal coverage ERS (1), which are estimated to cost $22M and $30M, respectively. Amplifying information for alternatives 2 and 3 are highlighted in yellow. Because of the large conducting ground planes needed to launch low angle coverage beams, an OTH system takes up considerable acreage. The transmitter and receiver sets require 30 acres of land each and a physical separation of 50 to 90 miles.

6. (S) The surveillance coverage from the Arabian Sea battle group operating areas to the southern part of the Soviet Union near the BACKFIRE staging base at Tashkent is shown on Figures 1 through 4 for candidate sites near Hafun, Somalia; Riyadh, Saudi Arabia; Muscat, Oman; and Ras Banas, Egypt, respectively. The figures depict the 60°, ERS, and the 90°, ERS (1), azimuthal area surveillance to 1,800 nautical miles. The northern edge of each 60° ERS scan sector has been boresighted at the Soviet BACKFIRE staging base at Tashkent. Adjacent 30° sectors have been added on each edge to show a 90° ERS (1). The shaded area on each figure indicates the region from which OTH-B radar returns to the receiving site are not supported by either ground wave or ionospheric skip modes of propagation. Radar returns from ground wave propagation cease at approximately 250 nautical miles. The shortest skip distance for normal ionospheric propagation begins at 500 nautical miles ground range. Therefore, aircraft transitting a range bin between 250 and 500 nautical miles would not be detected reliably. In the Arabian Sea ionospheric environment an automatic detection and track ERS or ERS (1), cumulative probability of detection exceeds 95 percent for targets less than 1,800 nautical miles from the OTH-B sites.

7. (C) For an OTH-B area surveillance system to be useful for protecting the battle groups operating in the Arabian Sea, the radar must maintain surveillance of those parts of Iran and Afghanistan beyond the coverage range of AWACS. It must also extend coverage over the battle group operating areas. If the OTH-B system must also provide unalerted tipoff of a strike aircraft threats to the battle groups, it must cover the Soviet BACKFIRE staging base at Tashkent. OTH-B radars process doppler returns to determine the radial closing velocity of threat targets. Because targets moving circumferentially present zero doppler return, those sites which most closely match a radial bearing from the battle group operating areas to the threat aircraft penetration routes are the interesting sites. These area surveillance coverage considerations were applied to prioritize the candidate locations in descending order of interest from Hafun, Somalia, the most interesting location, Figure 1, to Ras Banas, Egypt, Figure 4, the least interesting location. The difficulties of obtaining host government approval for an OTH-B installation in these countries were not considered.

8. (S) NRL and GE have estimated that three to six months are required to erect the antennas and to construct the operations buildings, access roads, prime power, and personnel facilities. Using a Tiger Team of system contractors and military personnel, an additional three months are required for installation of the ERS equipment at these prepared locations. In addition to the $22 to $30M relocation and installation cost for an ERS system each year of operations and support (O&S) would cost $6M, an O&S yearly cost comparable to the AWACS.

9. (C) To summarize, an OTH radar in a selected Middle East location would have the technical performance characteristics needed to provide, in conjunction with AWACS and fleet assets 100 percent area surveillance of the approaches to the battle groups in the Arabian Sea. If the national decisions were made in the early spring and negotiations with the host government were completed during the next four to five months, ERS could be operating by the fall of 1981. Figure 5 shows the time intervals which are anticipated for the negotiations, site preparations, and installation of an ERS. The uppermost line shows the current USAF performance tests and IOT&E plans for the spring of 1981. The lower line indicates clearly that moving ERS in July 1981 can be done with minimum disruption to current USAF and Navy plans for the system in Maine. The negotiation phase includes three months for a JCS decision, SECDEF approval, State Department concurrence and diplomatic arrangements with the host government, and an award of a sole source contract. As soon as the host government approves of the concept in principle, candidate sites

can be surveyed and a site can be selected. Estimates indicate that a Tiger Team for construction can clear the land, erect antennas, construct the operations building, and install site power, water, and POL in three months. By July 1981, the site can be ready to receive ERS. After shutting down ERS on 30 June 1981, it is estimated that dismantling, packing, and shipping the ERS in Maine to the new site can be completed in four to five weeks. Installation and hook-up can be finished in six weeks. IOC can be achieved four weeks later and the system can begin operating as a joint OTH/AWACS/E-2 fleet air early warning system in October 1981.

10. (C) Rear Admiral A. Baciocco was briefed on this OTH radar contingency concept several months ago. During our discussion of the concept in a 16 December meeting, Rear Admiral Baciocco expressed his views that the approach was technically feasible and that he could support a decision to move ERS. Based upon a favorable technical review of the feasibility of employing an OTH radar to detect surface ships and aircraft approaching the battle groups in the Arabian Sea, the relatively short time required to install the system, and favorable reaction from the Chief of Naval Research, the Navy program sponsor, I recommend:

o tasking NRL to prepare a detailed contingency plan to relocate ERS/CHURCH EYE to a Middle East location,

o coordinating this plan with the 414L USAF sponsors of the ERS system in Maine,

o preparing a CNOM for JCS review.

With highest respect,

Albert E. Brandenstein

DR. ALBERT E. BRANDENSTEIN