

# Naval Audit Service



## Audit Report



# E-2D Advanced Hawkeye Radar

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**N2010-0001**  
**14 October 2009**

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**DEPARTMENT OF THE NAVY**  
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7510  
N2009-NAA000-0070  
14 Oct 09

**MEMORANDUM FOR COMMANDER, NAVAL AIR SYSTEMS COMMAND  
(AIR-00G4)**

**Subj: E-2D ADVANCED HAWKEYE RADAR (AUDIT REPORT N2010-0001)**

**Ref:** (a) NAVAUDSVC memo N2009-NAA000-0070, dated 27 February 2009  
(b) SECNAV Instruction 7510.7F, "Department of the Navy Internal Audit"

**Encl:** (1) Methodology  
(2) Activities Visited or Contacted

**1. Introduction.**

a. We have completed the subject audit announced in reference (a). We found that the E-2D Advanced Hawkeye (AHE) program office is managing the E-2D radar system effectively to achieve the overall performance objective. We also determined the program office has a planning process with a logical progression towards resolution of the radar issues identified in the Operational Assessment (OA) and Developmental Testing (DT) concluded in November and December 2008, respectively. Radar performance issues, or discrepancy reports (DR), are listed and tracked in a contractor database.

b. The E-2D AHE program has gone through a restructuring due to a Nunn-McCurdy breach. Program Management Activity (PMA) 231 stated the breach was caused by a variety of factors, including Navy and Congressional removal of aircraft from the Low Rate Initial Production (LRIP) procurement plan, an inaccurate cost estimate at Milestone B in 2003, and Initial Operating Capability delays between 12 and 24 Months. Program restructuring by the Milestone Decision Authority (MDA) now requires quarterly briefings on the status of the DRs; exit criteria for LRIP Lots 1 and 2 prior to approval for LRIP Lots 3 and 4; and required exit criteria be developed for the Fiscal Year (FY) 2010 OA.

c. Because of the initiatives undertaken by the MDA to satisfy Department of Defense (DoD) and Department of Navy (DON) oversight requirements, and the supporting documentation provided by the program office, no recommendations were

made in this report, and no management response is required. Paragraph 5 of this report summarizes our audit results. Throughout this audit, we maintained regular contact with the E-2D AHE program office's Program Managers (31 March 2009, 9 April 2009, and 4 August 2009), personnel from the Office of the Deputy Assistant Secretary of the Navy (DASN) for Air Programs (AIR) (15 July 2009), personnel from the Office of the Deputy Chief of Naval Operations (DCNO) for Integration of Capabilities and Resources (N8) (15 July 2009), the Commander, Operational Test and Evaluation Force (COMOPTEVFOR) (27 May 2009) and the Program Executive Officer (PEO) for Tactical Aircraft Programs (T) (30 July 2009), who provided us with timely information for the E-2D radar system.

**2. Reason for Audit and Objective.** The FY 2009 Risk and Opportunity Assessment Report identified Improvement, Modification, and Upgrade acquisition programs as a high-risk area. For FY 2009, the Naval Air Systems Command (NAVAIR) had 10 Improvement, Modification, and Upgrade acquisition programs. We determined, based on our audit research, the E-2D AHE was one of the most critical acquisition programs for NAVAIR. The objective of the audit was to verify that the overall performance objective of the E-2D AHE Radar was being effectively and efficiently achieved.

### **3. Background.**

a. The E-2D AHE, an Acquisition Category (ACAT) I-D program, began as the E-2C Hawkeye (HE) 2000's Radar Modernization Program. The E-2D AHE program is managed by PMA 231, part of the PEO (T) at NAVAIR.

b. The E-2D AHE is an all-weather, twin engine, carrier-based aircraft designed to provide advanced warning to vector interceptors or strike aircraft of approaching enemy threats. Key objectives of the program include:

- Improved battle space target detection;
- Situational awareness, especially in the littorals;
- Support of Theater Air Missile Defense (TAMD) operations; and
- Improved operational availability.

Based on news articles and interviews with the program office, as the E-2D AHE's predecessor, the E-2C has been operational since 1973. Consequently, designing a new radar system around legacy support equipment became increasingly difficult. For this reason, the Radar Modernization Program evolved into the E-2D AHE, a complete upgrade of the E-2C to tackle obsolescence issues and emerging missions with the AN/APY-9 radar system being the most critical component of the new aircraft. The AN/APY-9 radar system should provide increased power, greater capture ranges,

enhanced overland and littoral capabilities, and improved detection and tracking performance.

c. The E-2D program office conducted an OA and DT in FY 2009. The test teams identified a number of issues which affected the performance of the AN/APY-9 radar system. To improve warfighter capabilities, the E-2D's radar issues identified during OA and DT need to be resolved using a logical and timely process. A planning process entitled "DR Impact Assessment and Resolution Process" was developed to address these issues.

d. Improving warfighter satisfaction by providing superior products is a goal in the Assistant Secretary of the Navy (Research, Development, and Acquisition's) (ASN (RDA's)) strategic plan. Strategies to achieve this goal include providing effective, reliable, and affordable systems. Measures of success for providing better products include greater affordability, improved effectiveness, and higher availability. We audited the E-2D AHE radar in terms of cost, schedule, and performance to determine if the desired results were being achieved.

#### **4. Scope and Methodology.**

a. The Naval Audit Service conducted the audit of the E-2D AHE Radar for DON between 31 March 2009 and 14 October 2009. We visited and/or contacted Flag Officers, senior management personnel, and contractor personnel at several locations, which are listed in Enclosure (2).

b. DON plans to produce a total of 75 E-2D aircraft by FY 2021. The E-2D will be equipped with the AN/APY-9 radar system, which is designed to represent a two generational leap in performance over the previous radar. The AN/APY-9 radar system represents the largest development for the E-2D AHE program, at an estimated lifecycle cost of \$2.4 billion, making it critical for the aircraft program's success.

c. We obtained and reviewed applicable guidance and documentation relating to DoD and DON acquisition processes, the NAVAIR Ethics program, and PEO (T)'s Managers' Internal Control (MIC) program. We also obtained and analyzed documentation associated with the cost, schedule and performance of the E-2D AHE radar. Enclosure (1) contains a detailed account of our methodology.

d. We conducted this audit in accordance with Generally Accepted Government Auditing Standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions. There were no previous audits of the E-2D AHE radar system during the last 5 years by the Naval Audit Service,

the DoD Inspector General, or the Government Accountability Office, so there was no need to perform audit follow-up.

e. The Federal Managers' Financial Integrity Act (FMFIA) of 1982, as codified in Title 31, United States Code, requires each Federal agency head to annually certify the effectiveness of the agency's internal and accounting system controls. In our opinion, the conditions noted in this report do not warrant reporting in the Auditor General's annual FMFIA memorandum identifying management control weaknesses to the Secretary of the Navy.

## **5. Summary of Audit Results.**

a. We determined, at this point in time, that the E-2D AHE program office is managing the E-2D radar system effectively to achieve the overall performance objective. Based on the information provided by the Integrated Product Team (IPT) Lead, the E-2D program is addressing, and has a logical progression plan toward resolution of, the outstanding discrepancies related to the radar system. Our audit concluded that PMA 231 has a planning process to address the Priority 1<sup>1</sup> and 2 discrepancies associated with the radar system for the E-2D. The planning process used to address the issues related to the radar is covered in the "DR Impact Assessment and Resolution Process."

b. The E-2D AHE program has gone through a restructuring due to a Nunn-McCurdy breach. PMA 231 stated the breach was caused by a variety of factors, including Navy and Congressional removal of aircraft from the LRIP procurement plan, inaccurate cost estimate at Milestone B in 2003, and Initial Operating Capability delays between 12 and 24 months. The restructuring aggressively addressed the schedule to reduce the time to complete the procurement of aircraft by 1 year. The MDA granted Milestone C approval to the E-2D AHE program. However, the MDA required the program office to: (1) provide quarterly briefs the MDA quarterly on the status of the resolution of radar issues and cost-reduction initiatives; (2) meet certain LRIP Lots 1 and 2 exit criteria before approval of LRIP Lots 3 and 4; and (3) develop exit criteria for the FY 2010 OA. In our opinion, execution directions and the acquisition strategy from the MDA is an effective model of oversight for an acquisition program because it bases future LRIP approvals on concrete methodology for addressing program issues, and requires quarterly briefings to keep the MDA informed of the program status.

c. We determined there were 15 radar performance issues, or DRs, identified during the OA and DT, which concluded in November/December 2008. These 15 radar

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<sup>1</sup> Based on their criticality to the overall E-2D mission and Key Performance Parameters, DRs are classified as Priority Level 1 through Priority Level 5. Priority 1 is the highest level of criticality and any issue with this classification is essential to the success of the E-2D mission. Priority 5 is the lowest level of criticality and poses no threat to mission success.

performance issues were classified as either Priority 1 or Priority 2 DRs, and can be grouped into the following four categories:

- Theater Air and Missile Defense;
- Reliability;
- Availability; and
- Maintainability.

Priority 1 and 2 issues must be resolved to satisfy the Key Performance Parameters (KPP) established in the Capabilities Development Document (CDD). Our audit included ensuring that a logical methodology existed for addressing these 15 radar performance issues effectively. A database is used to track all the DRs, including their status and progress achieved to date. Based on our analysis, the DR database provides a structured approach for resolving discrepancies, and, in our opinion, if implemented jointly with a reliable planning process, should enable achievement of program objectives.

d. PMA 231 personnel, as well as personnel from the offices of the DASN for Air Programs (AIR) and the Deputy Chief of Naval Operations (DCNO) for Integration of Capabilities and Resources (N8), stated there was a planning process to address the DRs reported during the DT and OA. Our concern was that, although all personnel associated with the E-2D program stated there was a planning process, no documentation of this process was provided by the Program Office during audit survey. We met with the IPT Lead, who outlined the same planning process as other PMA 231 personnel. However, the IPT Lead was able to provide a documented planning process called the “DR Impact Assessment & Resolution Process” used to logically address radar performance issues.

e. We analyzed and reviewed, with the IPT Lead, the “DR Impact Assessment & Resolution Process.” The “DR Impact Assessment & Resolution Process” consists of the following steps:

- DR is written and assessed for priority, mission, milestone, and flight test impact;
- Performance monitors (engineers) assess impact of DRs to current and future Interim Flight Clearances (IFC);
- IPTs review their DRs and assign DRs to future software releases based on test and milestone impact and IFC requirements;
  - DRs may be assigned to the next software build, or to a later software build, based on these considerations;
  - In advance of each software release, the Navy and contractor IPTs review the list of DRs assigned to the release;

- Integrated Test Team assesses ability to execute flights, including impact of any DRs; and
- Planning for future milestone events includes tracking of relevant DRs.

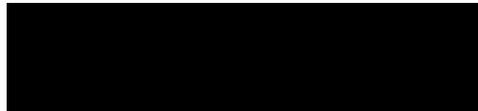
f. Based on our analysis, we concluded:

- The E-2D AHE program office is managing the E-2D radar system effectively to achieve the overall performance objective;
- Program efficiency could not be determined because additional MDA requirements have not been fully met;
- The Milestone Decision Authority has taken initiatives to satisfy DoD and DON oversight requirements; and
- A planning process is in place to ensure E-2D Priority 1 and 2 radar performance issues are addressed in a logical manner based on criticality and schedule requirements.

g. No further audit work on the E-2D AHE radar system is necessary at this time, and we are making no recommendations, so no formal response is required.

6. Any requests for this report under the Freedom of Information Act must be approved by the Auditor General of the Navy as required by reference (b). This audit report is also subject to followup in accordance with reference (b).

7. We appreciate the cooperation and courtesies extended to our auditors.



FOIA (b)(6)

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Assistant Auditor General  
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Subj: **E-2D ADVANCED HAWKEYE RADAR (AUDIT REPORT N2010-0001)**

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## Enclosure 1:

# Methodology

The Naval Audit Service conducted the audit of the E-2D Advanced Hawkeye (AHE) Radar System for the Department of the Navy (DON). We conducted this audit between 31 March 2009 and 14 October 2009. We visited and/or contacted Flag Officers, senior management personnel, and contractor personnel at several locations, which are listed in Enclosure (2).

We obtained and reviewed applicable guidance relating to the Department of Defense (DoD) and DON acquisition processes. The main criteria used were DoD Instruction 5000.01 (“The Defense Acquisition System”) and the DoD Instruction 5000.02 (“Operation of the Defense Acquisition System”). These instructions set forth the policies and procedures mandated for managing DoD acquisition programs, including the resolution of cost, schedule, and performance issues which may arise while the programs are active.

We interviewed Flag Officers and senior management personnel at the Program Executive Office, Tactical Aircraft Programs (PEO (T)) and Program Management Activity (PMA) 231, as well as contractor and Navy developmental and operational testers at a contractor’s facility. We obtained and analyzed documentation associated with the cost, schedule and performance of the E-2D AHE radar. We reviewed the following documents:

- Capabilities Development Document - Information necessary to develop a proposed program(s), normally using an evolutionary acquisition strategy;
- Acquisition Program Baseline Agreement - Key cost, schedule, and cost constraints in the phase succeeding the milestone for which it was developed;
- Milestone C Acquisition Decision Memorandum - Decisions made as the result of a Milestone Decision Review;
- Test and Evaluation Master Plan - The overall structure and objectives of the Test and Evaluation (T&E) program;
- Integrated Master Schedule – Schedule of E-2D procurement, developmental testing, operational testing, product delivery, review boards, milestones, etc.;
- Analysis of Alternatives - The evaluation of the Operational Effectiveness and Suitability and estimated costs of alternatives to meet a mission capability;
- Budget data – The radar contract and approved Fiscal Year 2010 budget data for the E-2D;

- Developmental Testing Reports - Results of testing used to assist in the development and maturation of products or manufacturing processes;
- Operational Testing Reports - Results of field testing, under realistic conditions, of weapons and equipments or munitions for the purpose of determining their effectiveness and suitability; and
- [Discrepancy Report] DR Impact Assessment and Resolution Process – PMA 231-specific planning process to address performance issues by priority.

Based on DoD Instruction 5500.7-R, “Joint Ethics Regulation” and Executive Order 12731, “Principles of Ethical Conduct for Government Officers and Employees,” we met with the legal department at Naval Air Systems Command Headquarters to discuss the ethics policies and procedures in place. Based on the information obtained, we concluded that NAVAIR’s ethics program met the DoD Instruction 5500.7-R and Executive Order 12731 criteria for implementation.

Secretary of the Navy Instruction 5200.35E, “Department of the Navy Managers’ Internal Control (MIC) Program,” dated 8 November 2006, requires commanders/managers to incorporate basic management controls in the strategies, plans, guidance, and procedures governing their programs and operations. We reviewed the inventory of assessable units in PEO (T)’s MIC program and identified the E-2D AHE as an assessable unit.

**Enclosure 2:**

# **Activities Visited and/or Contacted**

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- Assistant Secretary of the Navy for Research, Development and Acquisition, Arlington, VA
- Office of Deputy Assistant Secretary of the Navy for Air Programs, Arlington, VA
- Office of Deputy Chief of Naval Operations for Integration of Capabilities and Resources (N8), Director Air Warfare (N88)
- Naval Air Systems Command (NAVAIR), Naval Air Station, Patuxent River, MD
- Program Executive Officer for Tactical Aircraft Programs, Naval Air Station, Patuxent River, MD
- Program Management Activity 231, Naval Air Station, Patuxent River, MD
- Commander, Operational Test and Evaluation Force, Norfolk, VA
- Contractor facility, St. Augustine, FL
- Wyle Labs, Lexington Park, MD
- Office of NAVAIR Counsel (AIR 11.4), Naval Air Station, Patuxent River, MD
- Government Accountability Office (GAO), Washington, DC