Report No. DODIG-2024-136

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# INSPECTOR GENERAL

*U.S. Department of Defense*

SEPTEMBER 19, 2024

# (U) Audit of the E-2D Advanced Hawkeye Capabilities

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INDEPENDENCE ★ INTEGRITY ★ EXCELLENCE ★ TRANSPARENCY

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# (U) Results in Brief

## *(U) Audit of the E-2D Advanced Hawkeye Capabilities*

**September 19, 2024**

## (U) Objective

(U) The objective of the audit was to determine whether the Department of the Navy (Navy) effectively managed deficiencies identified during operational testing, to achieve the performance capabilities for the E-2D Advanced Hawkeye modifications.

## (U) Background

(U) The Assistant Secretary of the Navy (Research, Development, and Acquisition) (ASN[RD&A]) has the authority and accountability for all acquisition functions and programs in the Navy. The E-2/C-2 Airborne Command & Control Systems Program Office (PMA-231) manages the E-2D Advanced Hawkeye program. The E-2D Advanced Hawkeye is an all-weather, twin-engine, carrier-based, airborne early warning command, control, and surveillance aircraft. The E-2D program was approved to enter system development in 2003, and the Navy received the first aircraft in 2007. The Navy has fielded 62 E-2D Advanced Hawkeye aircraft and is funded for a total of 80 aircraft by 2026 for a total program cost of $22 billion.

(U) The Naval Air Systems Command contracted with the Northrop Grumman Corporation to perform software and hardware modifications in a series of phases between 2014 and 2027. As of February 2024, four modification phases had been tested and completed.

## (U) Finding

(U) PMA-231 did not effectively manage deficiencies identified during operational testing to achieve the performance capabilities for the E-2D Advanced Hawkeye modifications. Specifically, PMA-231 did not address or correct 141 (approximately two-thirds) of the 213 deficiencies identified in seven operational tests. This occurred because PMA-231 did not track unresolved operational test deficiencies or develop plans to correct unresolved operational test deficiencies that could have a mission impact. As a result, the E-2D Advanced Hawkeye does not have all required performance capabilities, which could prevent the Navy from accomplishing missions. PMA-231 may also need to spend additional money to modify the fielded E-2D Advanced Hawkeye and to update future aircraft that are still in production.

## (U) Recommendations

(U) We recommend that the ASN(RD&A):

- (U) direct PMA-231 to establish a process to track operational test deficiencies for the E-2D Advanced Hawkeye;
- (U) direct PMA-231 to evaluate all unresolved operational test deficiencies, determine whether action was taken to correct the deficiencies, and if not, determine if the deficiencies should stay unresolved. If the deficiencies should be resolved, develop and implement a plan to correct the deficiencies; and
- (U) develop a process to monitor the actions taken by PMA-231 to verify PMA-231 is tracking and developing plans for all deficiencies, including those already known and identified in the future.

# (U) Results in Brief

*(U) Audit of the E-2D Advanced Hawkeye Capabilities*

## (U) Management Comments and Our Response

(U) The ASN(RD&A) agreed with all recommendations; therefore, we consider the recommendations resolved and open. We will close the recommendations when we verify that management has implemented corrective actions. Please see the Recommendations Table on the next page for the status of the recommendations.

## *(U) Recommendations Table*

| (U) Management | Recommendations Unresolved | Recommendations Resolved | Recommendations Closed |
|---|---|---|---|
| Assistant Secretary of the Navy (Research, Development, and Acquisition) | None | 1.a 1.b and 1.c | None **(U)** |

**(U) Note:** The following categories are used to describe agency management's comments to individual recommendations.

- **(U) Unresolved** – Management has not agreed to implement the recommendation or has not proposed actions that will address the recommendation.
- **(U) Resolved** – Management agreed to implement the recommendation or has proposed actions that will address the underlying finding that generated the recommendation.
- **(U) Closed** – The DoD OIG verified that the agreed upon corrective actions were implemented.


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September 19, 2024

MEMORANDUM FOR AUDITOR GENERAL, DEPARTMENT OF THE NAVY

SUBJECT: (U) Audit of the E-2D Advanced Hawkeye Capabilities
(Report No. DODIG-2024-136)

(U) This final report provides the results of the DoD Office of Inspector General's audit. We previously provided copies of the draft report and requested written comments on the recommendations. We considered management's comments on the draft report when preparing the final report. These comments are included in the report.

(U) The Assistant Secretary of the Navy (Research, Development, and Acquisition) agreed to address all the recommendations presented in the report; therefore, we consider the recommendations resolved and open. We will close the recommendations when you provide us documentation showing that all agreed-upon actions to implement the recommendations are completed. Therefore, please provide us within 90 days your response concerning specific actions in process or completed on the recommendations. Send your response to either followup@dodig.mil if unclassified or rfunet@dodig.smil.mil if classified SECRET.

(U) We appreciate the cooperation and assistance received during the audit. If you have any questions, please contact me at [redacted].

FOR THE INSPECTOR GENERAL:

Carmen J. Malone
Assistant Inspector General for Audit
Acquisition, Contracting, and Sustainment

# (U) Contents

# (U) Introduction

## (U) Objective

(U) The objective of the audit was to determine whether the Department of the Navy (Navy) effectively managed deficiencies identified during operational testing, to achieve the performance capabilities for the E-2D Advanced Hawkeye modifications. See the appendix for a discussion of the scope and methodology and prior audit coverage related to the audit objective.[1]

## (U) Background

(U) The Assistant Secretary of the Navy (Research, Development, and Acquisition) (ASN[RD&A]) has the authority and accountability for all acquisition functions and programs in the Navy. Specifically, the ASN(RD&A) establishes policies and procedures and manages the research, development, and acquisition activities for the Navy in accordance with the DoD 5000 Series Directives. The ASN(RD&A) serves as the program decision authority on the E-2D Advanced Hawkeye program.

(U) The E-2/C-2 Airborne Command & Control Systems Program Office (PMA-231) manages the E-2D Advanced Hawkeye program. PMA-231 is supported by Naval Air Systems Command (NAVAIR), which delivers integrated air warfare capabilities to the fleet. PMA-231 provides acquisition strategies, logistics, and sustainment solutions for the E-2C Hawkeye, E-2D Advanced Hawkeye, Hawkeye 2000, and the C-2A Greyhound fleet.

(U) The E-2D Advanced Hawkeye is an all-weather, twin-engine, carrier-based tactical management, airborne early warning command, control, and surveillance aircraft. The E-2D program was approved to enter system development in 2003 and featured a state-of-the-art radar. The first E-2D Advanced Hawkeye aircraft was received in June 2007, and final production was approved in March 2013. The Navy has already fielded 62 E-2D Advanced Hawkeye aircraft and is funded to acquire a total of 80 aircraft by 2026 for a total program cost of $22 billion. The Navy plans to fly the E-2D Advanced Hawkeye into the 2040s. See Figure 1 for a picture of the E-2D Advanced Hawkeye.

[1] (U) This report contains information that has been redacted because it was identified by the Department of Defense as Controlled Unclassified Information (CUI) that is not releasable to the public. CUI is Government-created or owned unclassified information that allows for, or requires, safeguarding and dissemination controls in accordance with laws, regulations, or Government-wide policies.


(U) Figure 1. E-2D Advanced Hawkeye
(U) Source: NAVAIR.

## *(U) E-2D Advanced Hawkeye Modifications*

(U) NAVAIR contracted with the Northrop Grumman Corporation to perform a series of software and hardware modifications of the E-2D Advanced Hawkeye to compete with emerging technology and threats. The Northrop Grumman Corporation is a global aerospace, defense, and security company. The Northrop Grumman Corporation is modifying the cockpit avionics, mission systems, and communication capabilities. The hardware and software modifications are accomplished in phases, which are called Delta System Software Configurations (DSSCs). See Table 1 for a description of each DSSC modification, the follow-on test and evaluation (FOT&E) dates, and the intended capability.

*(U) Table 1. DSSC Modifications, FOT&E Testing Dates, and Capabilities*

| (U) DSSC | FOT&E Start Date | FOT&E Completion Date | Modifications/Capabilities |
|---|---|---|---|
| 1 | July 2014 | May 2015 | DSSC-1 included upgrades to multiple systems such as the radar system, mission computer display, and communication systems. |
| 2 | July 2016 | October 2016 | DSSC-2 incorporated prior test deficiency corrections and added a satellite communication capability. It also incorporated a friend or foe interrogation capability. (U) |

*(U) Table 1. DSSC Modifications, FOT&E Testing Dates, and Capabilities (cont'd)*

| (U) DSSC | FOT&E Start Date | FOT&E Completion Date | Modifications/Capabilities |
|---|---|---|---|
| 3 | March 2019 | October 2019 | DSSC-3 incorporated improvements to the target tracking functionality. The Navy also put out a DSSC 3.1 update, which included updates to the radio and communication systems and aerial refueling capability. |
| 4 | May 2023 | January 2024 | DSSC-4 included upgrades to the data fusion, global positioning system, and the radar. It also improved the beyond line-of-sight communications and sensor integration and incorporated tactical targeting networking technology. |
| 5 | Planned FY 2025 | | DSSC-5 will include upgrades to the sensors and counter electronic attack capability. |
| 6 | Planned FY 2027 | | DSSC-6 will include readiness and reliability upgrades paired with architecture improvements. **(U)** |

(U) Source: DOT&E, PMA-231, and OPTEVFOR.

## *(U) E-2D Advanced Hawkeye Testing Process*

(U) Secretary of the Navy Instruction 5000.2G states that the Commander, Operational Test and Evaluation Force must conduct operational tests and evaluations of Navy major capability acquisition programs. In May 2022, the Commander, Operational Test and Evaluation Force, was renamed the Operational Test and Evaluation Force (OPTEVFOR). OPTEVFOR is the independent test agency responsible for conducting operational test and evaluation for Navy, Marine Corps Aviation, and joint acquisition programs. OPTEVFOR is required to plan, conduct, evaluate, and report the operational test and evaluation of Navy acquisition programs.[2]

(U) OPTEVFOR completed the initial operational test and evaluation (IOT&E) for the E-2D Advanced Hawkeye in FY 2013. IOT&E is used to determine whether systems are operationally effective and operationally suitable. Operational effectiveness is the measurement of the overall ability of a system to accomplish a mission when used by representative personnel in the environment planned or expected for actual use of a system. Operational suitability is the degree to which a system can be satisfactorily fielded considering reliability, availability, safety, and other requirements.

[2] (U) Secretary of the Navy Instruction 5000.2G, "Department of the Navy Implementation of the Defense Acquisition System and the Adaptive Acquisition Framework," April 8, 2022.

(U) OPTEVFOR completed the FOT&E for the E-2D Advanced Hawkeye program in FY 2015, including testing the modifications for the DSSC-1. FOT&E is designed to test system changes and verify whether the program continues to meet operational needs and retains its effectiveness in new environments or against new threats. In addition, OPTEVFOR completed FOT&E for DSSC-2 in FY 2017, DSSC-3 in FY 2020, and DSSC-4 in FY 2024. The modifications in these DSSCs for the E-2D Advanced Hawkeye include the following subsystems and capabilities to enable the performance of its mission:

- (U) AN/APY-9 phased array radar upgrades,
- (U) Tactical Targeting Network Technology data link,
- (U) Multi-Functional Information Distribution System,
- (U) Cooperative Engagement Capability,
- (U) Satellite communications,
- (U) Electronic Support Measures,
- (U) Electronic Protection,
- (U) Aerial refueling,

(U) During IOT&E and FOT&E, OPTEVFOR tests the system for established capabilities, which include Key Performance Parameters (KPPs) and Key System Attributes. A KPP is a performance attribute of a system considered critical or essential to the development of an effective military capability. KPPs must be met for a system to meet its operational goals. A Key System Attribute is a performance attribute of a system considered important to achieving a balanced solution or approach to a system, but not critical enough to be designated as a KPP.

(U) The Director, Operational Test and Evaluation (DOT&E) provided oversight of OPTEVFOR's testing for E-2D Advanced Hawkeye. The DOT&E is the principal official and advisor to the Secretary of Defense on all DoD matters related to operational test and evaluation, live fire test and evaluation of DoD systems, and services acquired through the Defense acquisition system. The DOT&E began reporting on the E-2D Advanced Hawkeye in its FY 2009 annual report and has reported on the program every year since, except for annual reports in FYs 2017, 2018 and 2021.

## *(U) Correction of E-2D Advanced Hawkeye Testing Deficiencies*

(U) PMA-231 is responsible for addressing IOT&E and FOT&E testing deficiencies identified by the test organizations. PMA-231 is expected to submit a verification of correction of deficiencies (VCD) to OPTEVFOR identifying the specific deficiencies corrected.[3] Secretary of the Navy Instruction 5000.2G states that intent of the VCD process is to confirm that deficiencies identified during testing were corrected. A VCD can occur through OPTEVFOR's review of corrective actions or, in some cases, through an end-to-end test of the complete system, depending on the complexity of the system and the extent of the corrections.

(U) OPTEVFOR developed a memorandum of agreement with PMA-231 to streamline a portion of the VCD process. The agreement, dated January 28, 2021, was intended for a continuously updated master list of corrected operational deficiencies before each follow-on operational testing period. This agreement is designed for OPTEVFOR to evaluate and close deficiencies during all integrated test opportunities for the E-2D Advanced Hawkeye based upon the latest information from PMA-231. Additionally, PMA-231 is responsible for maintaining a current and complete list of corrected operational deficiencies.

(U) According to the agreement, PMA-231 will update this list based upon hardware, software, training, publication, or other system improvements, as well as preliminary test results. For each corrected deficiency, PMA-231 agreed to provide OPTEVFOR justifying information, including root cause analysis, corrective actions, and developmental test results. PMA-231 also agreed to provide the updated list of corrected deficiencies and associated information to OPTEVFOR on a quarterly basis.

[3] (U) Commander, Operational Test and Evaluation Force, "Test Reporting Handbook," Version 2.0, February 4, 2021.

# (U) Finding

## (U) The Navy Did Not Effectively Manage Operational Testing Deficiencies to Achieve Performance Capabilities

(U) PMA-231 did not effectively manage deficiencies identified during operational testing to achieve the performance capabilities for the E-2D Advanced Hawkeye modifications. Specifically, PMA-231 did not properly manage the E-2D Advanced Hawkeye to address or correct 141 (approximately two-thirds) of the 213 deficiencies identified in seven operational tests, including one major deficiency that directly affected a KPP. This occurred because PMA-231 did not:

- (U) track unresolved operational test deficiencies; or
- (U) develop plans to correct operational testing deficiencies that could have a mission impact.

~~(CUI)~~ As a result, the E-2D Advanced Hawkeye does not have all required performance capabilities, including the [redacted] KPP, which could prevent the Navy from accomplishing missions. PMA-231 may also need to spend additional money to modify the fielded E-2D Advanced Hawkeye and to update future aircraft that are still in production.

## (U) The Navy Did Not Resolve Approximately Two-Thirds of Deficiencies

(U) PMA-231 did not effectively manage deficiencies identified during operational testing to achieve the performance capabilities for the E-2D Advanced Hawkeye modifications. Specifically, PMA-231 did not properly manage the E-2D Advanced Hawkeye to address or correct 141 (approximately two-thirds) of the 213 deficiencies identified in seven operational tests, including one major deficiency that directly affected a KPP.

~~(CUI)~~ OPTEVFOR conducted seven operational tests for the E-2D Advanced Hawkeye between 2011 and 2020. OPTEVFOR identified 213 deficiencies during the seven operational tests. Of the 213 deficiencies, 72 (34 percent) have been resolved, and 141 (66 percent) deficiencies were still unresolved as of February 2024, including the one unresolved major deficiency that directly affected the [redacted] KPP. [redacted]. The radar is the aircraft's primary means to detect and track land and sea contacts.

(U) OPTEVFOR classifies testing deficiencies as severe, major 1, major 2, major 3 and minor. See Table 2 for the OPTEVFOR classification of testing deficiencies and number of unresolved and resolved deficiencies.

*(U) Table 2. Classification of Testing Deficiencies and Number of Unresolved and Resolved Deficiencies.*

| (U) Type | Definition | Number of Unresolved Deficiencies | Number of Resolved Deficiencies | Total |
|---|---|---|---|---|
| Severe | Precludes mission accomplishment | 0 | 0 | 0 |
| Major 1 | Critical impact on mission accomplishment | 30 | 10 | 40 |
| Major 2 | Serious impact on mission accomplishment | 33 | 17 | 50 |
| Major 3 | Moderate impact on mission accomplishment | 38 | 24 | 62 |
| Minor | No significant impact on mission accomplishment | 40 | 21 | 61 |
| **Totals** | | **141** | **72** | **213 (U)** |

(U) Source: PMA-231 and OPTEVFOR.

~~(CUI)~~ Major deficiencies have a significant impact on mission accomplishment and are described as critical, serious, or moderate depending on the deficiency level. For example, OPTEVFOR identified a major 1 deficiency that air crews were unable to lock their seats into the appropriate position during aircraft carrier landings. During testing, [redacted] were evaluated to determine whether the [redacted] for all aircraft [redacted], as required. [redacted] are designed to [redacted]. [redacted]. During [redacted]. [redacted]

~~(CUI)~~ Minor deficiencies do not have a significant impact on mission accomplishment. For example, OPTEVFOR identified a minor deficiency in which one of the tracking screens had an obscured view, affecting the operator's ability to detect objects as early as possible. Specifically, during testing, the [redacted] was designed to [redacted]. [redacted] included a [redacted]. The [redacted] The [redacted] The [redacted] for operators to either [redacted].

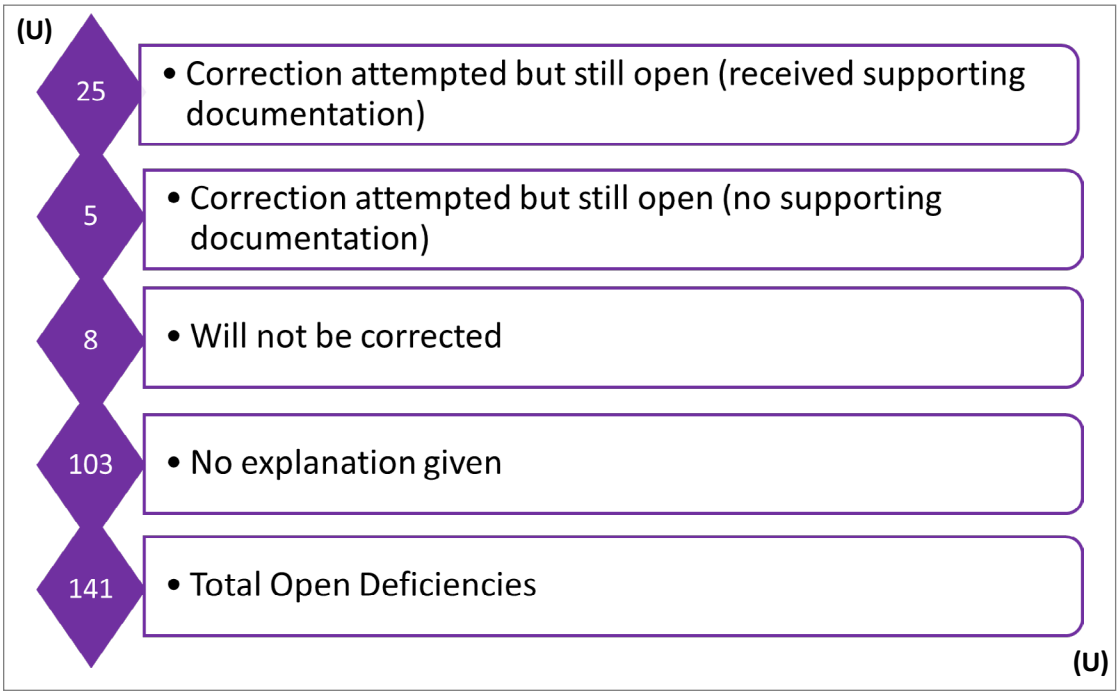
## (U) PMA-231 Did Not Track or Have Plans to Correct Test Deficiencies

(U) PMA-231 did not track unresolved operational test deficiencies. Additionally, PMA-231 did not develop plans to correct operational testing deficiencies that could have a mission impact. PMA-231 officials acknowledged that they did not have a central system for tracking operational test deficiencies and stated that they should have had one. The January 2021 PMA-231 memorandum of agreement with OPTEVFOR states that PMA-231 is responsible for maintaining a current and complete list of corrected operational deficiencies. However, PMA-231 did not maintain the updated list of corrected deficiencies. PMA-231 officials did not know how many of the unresolved deficiencies were corrected.

(U) In addition, according to PMA-231 officials, there was no formal system in place to track unresolved operational test deficiencies. PMA-231 officials stated that information on the deficiencies was not in a single location and that older deficiencies were particularly difficult to track because personnel had changed over time. Therefore, the ASN(RD&A) should direct PMA-231 to establish a process to track operational test deficiencies for the E-2D Advanced Hawkeye.

(U) PMA-231 provided information on the unresolved deficiencies 2 months after we requested the data. See Figure 2 for the status of the unresolved major deficiencies.

*(U) Figure 2. Status of Unresolved Deficiencies*




(U) Source: PMA-231.

(U) PMA-231 officials stated that they corrected 25 of the 141 deficiencies and submitted a request for VCD in January 2019 to OPTEVFOR. For example, the clear function on the electronic surveillance system did not clear all tracks as intended. According to PMA-231, software coding updates resolved this discrepancy. These 25 deficiencies were evaluated during the DSSC-3 operational test period according to OPTEVFOR officials, but OPTEVFOR did not verify them as corrected.

(U) PMA-231 officials also stated that they corrected an additional 5 of the 141 deficiencies but could not provide any supporting documentation to verify that the corrections fixed the deficiencies or that the corrections had been tested. For example, the navigation system for the aircraft experienced failures during testing. PMA-231 officials stated that the deficiency will be resolved through future modifications, however no action has been taken yet. Therefore, the deficiency remains unresolved.

(U) PMA-231 officials stated that 8 of the 141 deficiencies were unresolved and that they made the determination to not correct these deficiencies. For example, the E-2D Advanced Hawkeye suffered an electrical power failure during two separate operational tests resulting in a major 3 deficiency. During DSSC-1 testing, the electrical power system was evaluated. However, after extensive troubleshooting, the electrical system worked normally for the remainder of the exercise. PMA-231 officials determined the deficiency did not need further corrective actions and stated that they had no plans to address the deficiency. PMA-231 officials stated that deficiencies may go uncorrected in cases in which the deficiency is an isolated incident such as the example but may also remain unresolved for budgetary reasons or if the deficiency becomes obsolete through upgrades or improvements.

~~(CUI)~~ Secretary of the Navy Instruction 5000.2G states that programs should develop plans to address testing deficiencies. PMA-231 is responsible for correcting identified testing deficiencies. However, PMA-231 officials acknowledged that they should have had a central system for tracking operational test deficiencies. As a result, PMA-231 officials did not know whether the remaining 103 unresolved deficiencies were evaluated or whether there were any plans to correct the deficiencies, including the one unresolved major deficiency that directly affected the [redacted] KPP. The remaining 103 unresolved deficiencies included 63 major and 40 minor deficiencies.

*(U) Secretary of the Navy Instruction 5000.2G states that programs should develop plans to address testing deficiencies. PMA-231 is responsible for correcting identified testing deficiencies.*

(U) In May 2024, OPTEVFOR provided PMA-231 with its report on DSSC-4 testing. The report included 34 new deficiencies. Specifically, OPTEVFOR identified 16 major 1 deficiencies, 3 major 2 deficiencies, 8 major 3 deficiencies, and 7 minor deficiencies. Additionally, two previously identified deficiencies were downgraded but were still considered major and unresolved. PMA-231 has not had an opportunity to address these new deficiencies; therefore, we did not include these deficiencies in the audit. However, if PMA-231 continues to not track or develop plans to address deficiencies, the E-2D program may not achieve all the required capabilities. Therefore, the ASN(RD&A) should direct PMA-231 to evaluate all unresolved operational test deficiencies, determine whether action was taken to correct the deficiencies, and if not, determine whether the deficiencies should stay unresolved. If the deficiencies should be resolved, develop and implement a plan to correct deficiencies that impact mission accomplishment. PMA-231 should request that OPTEVFOR confirm the correction of deficiencies. Additionally, the ASN(RD&A) should develop a process to monitor the actions taken by PMA-231 to verify PMA-231 is tracking and developing plans for all deficiencies, including those already known and identified in the future.

## (U) The Fielded Version of the E-2D Lacks Capability That May Cost the Navy to Address

~~(CUI)~~ The E-2D Advanced Hawkeye does not have all required performance capabilities, including the [redacted] KPP, which could prevent the Navy from accomplishing missions. According to OPTEVFOR's DSSC-3 test report, the E-2D Advanced Hawkeye is operationally effective, [redacted]. Operational effectiveness is the system's ability to accomplish a mission and operational suitability is the system's ability to be fielded with all of the planned capabilities.

(U) Additionally, the DOT&E has consistently reported reliability issues with the E-2D Advanced Hawkeye radar and the inability of the Navy to keep the aircraft maintained and available. The DOT&E recommended that the Navy correct these issues but as of 2024, the recommendations remained unresolved. These limitations may preclude the E-2D Advanced Hawkeye from accomplishing the mission requirements.

~~(CUI)~~ PMA-231 may also need to spend additional money to modify the fielded E-2D Advanced Hawkeye and to update future aircraft that are still in production. PMA-231 is budgeted to spend $22 billion to acquire a total of 80 aircraft and has already fielded 62 aircraft that do not meet the required performance capabilities. PMA-231 may need to spend additional money to implement corrections to meet the [redacted] KPP. Additionally, PMA-231 may need to spend additional money to correct unresolved deficiencies to develop the performance capabilities necessary to accomplish missions.

## (U) Recommendations, Management Comments, and Our Response

### *(U) Recommendation 1*

**(U) We recommend that the Assistant Secretary of the Navy (Research, Development, and Acquisition):**

a. **(U) Direct PMA-231 to establish a process to track operational test deficiencies for the E-2D Advanced Hawkeye.**

b. **(U) Direct PMA-231 to evaluate all unresolved operational test deficiencies, determine whether action was taken to correct the deficiencies, and if not, determine if the deficiencies should stay unresolved. If the deficiencies should be resolved, develop and implement a plan to correct the deficiencies that impact mission accomplishment. PMA-231 should request that the Operational Test and Evaluation Force, confirm the correction of deficiencies.**

### *(U) Assistant Secretary of the Navy (Research, Development, and Acquisition) Comments*

(U) The ASN(RD&A) agreed with Recommendations 1.a and 1.b. The Navy will direct PMA-231 to develop a process to track operational test deficiencies for the E-2D Advanced Hawkeye. PMA-231 is already in the process of conducting deficiency reviews to track, assign, adjudicate, and monitor operational test deficiencies with interim and formal review boards within the program office. The ASN(RD&A) stated that all actions will be implemented no later than December 1, 2024.

### *(U) E-2/C-2 Airborne Command & Control Systems Program Office Comments*

(U) Although not required to comment, the Program Executive Officer, PMA-231, agreed with Recommendations 1.a and 1.b. The Program Executive Officer stated that PMA-231 will begin deficiency reviews on a weekly basis and will initiate and sustain an operational test deficiency board. Additionally, the Program Executive Officer stated that PMA-231 will develop and use a database containing all E-2D operational testing deficiencies to track status, actions taken to investigate the deficiencies, and program decisions for the correction of the deficiencies. These actions will be fully implemented by December 1, 2024. The Program Executive Officer also stated that PMA-231 will provide an update on the disposition of operations test deficiencies to the Program Executive Officer, Test and Evaluation.

**c. (U) Develop a process to monitor the actions taken by PMA-231 to verify PMA-231 is tracking and developing plans for all deficiencies, including those already known and identified in the future.**

### *(U) Assistant Secretary of the Navy (Research, Development, and Acquisition) Comments*

(U) The ASN(RD&A) agreed with the recommendation. The ASN(RD&A) stated that PMA-231 will provide a summary of the progress taken for the recommendations in this report during the next Gate 6 review and subsequent annual reviews.

### *(U) E-2/C-2 Airborne Command & Control Systems Program Office Comments*

(U) Although not required to comment, the Program Executive Officer, PMA-231, disagreed that ASN(RD&A) needs a process to monitor the actions of PMA-231. However, the Program Executive Officer also stated that PMA-231 will implement the processes and will support a review no earlier than December 1, 2024. The Program Executive Officer also stated that PMA-231 will provide the ASN(RD&A) a status update during the next Gate 6 review and will include a summary of recommendations in subsequent annual reviews.

### *(U) Our Response*

(U) Comments from the ASN(RD&A) addressed all specifics of the recommendations; therefore, all recommendations are resolved, but will remain open. Although the Program Executive Officer disagreed with Recommendation 1.c, comments from the Program Executive Officer met the intent of the recommendation. The Program Executive Officer stated that PMA-231 will provide the ASN(RD&A) a status update during the next Gate 6 review and will include a summary of recommendations in subsequent annual reviews. The ASN(RD&A) agreed to monitor actions taken by PMA-231 during the next Gate 6 review and subsequent annual reviews. Therefore, we will close the recommendations once we verify that the information provided and actions taken by the ASN(RD&A) fully address the recommendations.

# (U) Appendix

## (U) Scope and Methodology

(U) We conducted this performance audit from October 2023 through July 2024 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 based on our audit objectives.

(U) To determine whether the Navy effectively managed deficiencies identified during operational testing, and to achieve the performance capabilities for the E-2D Advanced Hawkeye modifications, we interviewed officials from the following Components to identify their roles and responsibilities and obtained documentation for the performance capabilities of the E-2D Advanced Hawkeye modifications.

- (U) Office of the Under Secretary of Defense for Acquisition and Sustainment
- (U) DOT&E
- (U) ASN(RD&A)
- (U) Director, Air Warfare, Office of the Chief of Naval Operations
- (U) NAVAIR
- (U) PMA-231
- (U) OPTEVFOR
- (U) Northrop Grumman

(U) We reviewed the capabilities development document, test and evaluation master plan, IOT&E report, FOT&E reports, VCD requests, and DOT&E reports. We also reviewed the capabilities development document to determine the required capabilities for the aircraft. We further reviewed the IOT&E report and FOT&E reports to determine what capabilities were achieved. We then requested that PMA-231 and OPTEVFOR provide VCDs to demonstrate that the corrections of testing deficiencies were resolved.

(U) Northrop Grumman reviewed relevant portions of the draft report but did not have any comments to be considered in preparing the final report.

(U) We reviewed the following DoD and Navy guidance related to capabilities and testing.

- (U) DoD Directive 5000.01, "The Defense Acquisition System," September 9, 2020 (Incorporating Change 1, July 28, 2022)
- (U) DoD Directive 5141.02, "DOT&E," February 2, 2009
- (U) DoD Instruction 5000.02, "Operation of the Adaptive Acquisition Framework," January 23, 2020 (Incorporating Change 1, June 8, 2022)
- (U) DoD Instruction 5000.89, "Test and Evaluation," November 19, 2020
- (U) Secretary of the Navy Instruction 5000.2G, "Department of the Navy Implementation of the Defense Acquisition System and the Adaptive Acquisition Framework," April 8, 2022
- (U) NAVAIR M-3905.1, "Test Reporting Manual," May 22, 2017
- (U) Commander, Operational Test and Evaluation Force, "Test Reporting Handbook," Version 2.0, February 4, 2021

(U) This report was reviewed by the DoD Components associated with this oversight project to identify whether any of their reported information, including legacy FOUO information, should be safeguarded and marked in accordance with the DoD CUI Program. In preparing and marking this report, we considered any comments submitted by the DoD Components about the CUI treatment of their information. If the DoD Components failed to provide any or sufficient comments about the CUI treatment of their information, we marked the report based on our assessment of the available information.

## (U) Internal Control Assessment and Compliance

(U) We assessed internal controls and compliance with laws and regulations necessary to satisfy the audit objective. In particular, we assessed internal controls related to monitoring and risk assessment. Additionally, because PMA-231 officials are not tracking the open deficiencies, they cannot properly assess the risk of the open deficiencies as it relates to obtaining capabilities for the E-2D Advanced Hawkeye. We assessed the monitoring and risk assessment based on our audit objective and the analysis of the seven operational test reports that identified 141 open testing deficiencies that have not been closed and plans could not be provided on addressing the open deficiencies. Operational testing deficiencies that remain open and are not monitored can affect the ability of the program to obtain required performance capabilities. However, because our review was limited to these internal control components and underlying principles, it may not have disclosed all internal control deficiencies that may have existed at the time of this audit.

## (U) Use of Computer-Processed Data

(U) We did not use computer-processed data to perform this audit.

## (U) Prior Coverage

(U) During the last 6 years, the Government Accountability Office (GAO) issued three reports discussing the E-2D Advanced Hawkeye. Unrestricted GAO reports can be accessed at http://www.gao.gov.

### *(U) GAO*

(U) Report No. GAO-21-101SP, "Weapon System Sustainment: Aircraft Mission Capable Rates Generally Did Not Meet Goals and Cost of Sustaining Selected Weapon System Varied Widely," November 19, 2020

> (U) The GAO examined 46 types of aircraft. The GAO found that the E-2D fleet did not meet its annual mission capable goals from FY 2014 through FY 2019, and its mission capable rate decreased during that period. Additionally, total operating costs consistently increased and the E-2D faced maintenance and supply challenges. The Navy took action to mitigate those challenges, such as troubleshooting component failures and cannibalizing parts.

(U) Report No. GAO-19-336SP, "Weapon System Annual Assessment: Limited Use of Knowledge-Based Practices Continues to Undercut DoD's Investments," May 7, 2019

> (U) The GAO reviewed 82 weapon system acquisition programs totaling $1.69 trillion. The GAO included the E-2D in a list of programs that highlighted changes in estimated total acquisition costs, number of contracts, and contracts with subcontracting reports.

(U) Report No. GAO-18-678, "Weapon System Sustainment: Selected Air Force and Navy Aircraft Generally Have Not Met Availability Goals, and DoD and Navy Guidance Need to be Clarified," September 10, 2018

> (U) Congress mandated that the GAO evaluate the sustainment of major weapon systems. The GAO reviewed the E-2D and found that the program was experiencing maintenance and supply issues. At the time, the Navy was taking action to mitigate those challenges, such as troubleshooting component failures, and cannibalizing parts.

# (U) Management Comments

## (U) Assistant Secretary of the Navy (Research, Development, and Acquisition)

THE ASSISTANT SECRETARY OF THE NAVY
(RESEARCH, DEVELOPMENT, AND ACQUISITION)
1000 NAVY PENTAGON
WASHINGTON, DC 20350-1000

AUG 14 2024

[redacted]
Office of Inspector General
Department of Defense
4800 Mark Center Drive
Alexandria, Virginia 22350-1500

Dear [redacted]

This is the Department of the Navy's response to the Department of Defense Inspector General draft report, D2024-D000AT-0012.000, "(U) Audit of the E-2D Advanced Hawkeye Capabilities," dated July 16, 2024.

The Department appreciates the opportunity to comment on the draft report. The Department concurs with recommendations 1.a, 1.b, and 1.c. Implementation of corrective actions and technical review are enclosed.

For further questions regarding this report, please contact [redacted] who can be reached at [redacted] and [redacted]

Nickolas H. Guertin

Attachment:
As stated

# (U) Assistant Secretary of the Navy (Research, Development, and Acquisition) (cont'd)

**DoD IG DRAFT REPORT DATED JULY 16, 2024**
**D2024-D000AT-0012.000**

**"(U) Audit of the E-2D Advanced Hawkeye Capabilities"**

**DEPARTMENT OF THE NAVY COMMENTS**
**TO DODIG RECOMMENDATIONS**

**RECOMMENDATION 1.a:** Direct PMA-231 to establish a process to track operational test deficiencies for E-2D Advanced Hawkeye.

**DoN RESPONSE:** Concur. The Navy will direct PMA-231 to develop a process to track operational test deficiencies for the E-2D AHE. PMA-231 is already in the process of conducting deficiency reviews to track, assign, adjudicate, and monitor OT deficiencies with interim and formal review boards within the program office. The corrective actions will be fully implemented no later than 1 December 2024.

**RECOMMENDATION 1.b:** Direct PMA-231 to evaluate all unresolved operational test deficiencies, determine whether action was taken to correct the deficiencies, and if not, determine if the deficiencies should stay unresolved. If the deficiencies should be resolved, develop and implement a plan to correct the deficiencies that impact mission accomplishment. PMA-231 should request that the Operational Test and Evaluation Force, confirm the correction of deficiencies.

**DoN RESPONSE:** Concur. The steps taken in recommendation 1.a. will satisfy this recommendation.

**RECOMMENDATION 1.c:** Develop a process to monitor the actions taken by PMA-231 to verify PMA-231 is tracking and developing plans for all deficiencies, including those already known and identified in the future.

**DoN RESPONSE:** Concur. During the next Gate 6 review and subsequent annual reviews, PMA-231 will provide of summary of the progress taken for the recommendations listed in the DoD IG report.

# (U) E-2/C-2 Airborne Command & Control Systems Program Office

**DEPARTMENT OF THE NAVY**
PROGRAM EXECUTIVE OFFICER
TACTICAL AIRCRAFT PROGRAMS
47123 BUSE ROAD, UNIT IPT
PATUXENT RIVER, MD 20670-1547

7000
Ser PMA-231/070
14 August 2024

From: Program Executive Officer, Tactical Aircraft Programs (PMA-231)
To: Department of Defense Office of Inspector General

Subj: DoDIG Audit of E-2D Program

Encl: (1) PMA-231 Response to Audit of the E-2D Advanced Hawkeye Capabilities Pre-Decisional Report

Part 1:
*(U) Recommendation 1*
(U) We recommend that Assistant Secretary of the Navy (Research, Development, and Acquisition):

1. (U) Direct PMA-231 to establish a process to track operational test deficiencies for the E-2D Advanced Hawkeye.
    a. (U) PMA-231 agrees with this recommendation.
    b. (U) PMA-231 will begin interim OT deficiency reviews with the IPTs the deficiencies are assigned to on a weekly basis during the ITT meeting.
    c. (U) PMA-231 will initiate and sustain an OT deficiency board and develop/utilize a database containing all E-2D AHE OT deficiencies to track status, actions taken to investigate the deficiency, and program decisions for the correction of the deficiency. These actions noted will be fully implemented by 01 Dec 2024.

2. (U) Direct PMA-231 to evaluate all unresolved operational test deficiencies, determine whether action was taken to correct the deficiencies, and if not, determine if the deficiencies should stay unresolved. If the deficiencies should be resolved, develop and implement a plan to correct the deficiencies that affect mission accomplishment; and develop a process to monitor the actions taken by PMA-231 to verify PMA-231 is tracking and developing plans for all deficiencies, including those already known and identified in the future.
    a. (U) PMA-231 agrees with this recommendation.
    b. (U) PMA-231 will implement the process outlined in the response to recommendation one.
    c. (U) PMA-231 will provide an update on the disposition of OT deficiencies to PEO(T) Test and Evaluation (T&E) upon request.

3. (U) Develop a process to monitor the actions taken by PMA-231 to verify PMA-231 is tracking and developing plans for all deficiencies, including those already known and identified in the future.
    a. (U) PMA-231 disagrees with the recommendation that ASN(RDA) needs to develop a process to monitor the actions taken by PMA-231
    b. (U) PMA-231 will implement the processes described in the responses to recommendations one and two and will be able to support a process review no earlier than (NET) 01 Dec 2024.
    c. (U) PMA-231 will provide ASN(RDA) a status update during the next Gate 6 Review and will include a summary of recommendations one and two in subsequent annual reviews.

# (U) E-2/C-2 Airborne Command & Control Systems Program Office (cont'd)

Part 2:

1. (U) Review Report Markings and Potential Release to the Public, Congressional Committees of Jurisdictions, and Individual Members of Congress. This report will be considered for release to the public, congressional committees of jurisdiction and to individual members of Congress consistent with the authorities and responsibilities of the DoD OIG and the markings applied to the final report. DoD CUI categories and LDCs are located at the DoD CUI Program website – https://www.dodcui.mil/
   Please provide PMA/PEO written response if any specific information in the draft report, as well as your response to the draft, is exempt from release in accordance with an applicable CUI category or under the Freedom of Information Act (FOIA), United States Code, Title 5, Section 552.
   a. See Enclosure (1)

PETE A. ~~ARROBIO~~
By direction

# (U) Acronyms and Abbreviations

| | |
|---|---|
| **(U) ASN(RD&A)** | Assistant Secretary of the Navy (Research, Development, and Acquisition) |
| **(U) DOT&E** | Director, Operational Test & Evaluation |
| **(U) DSSC** | Delta System Software Configuration |
| **(U) FOT&E** | Follow-On Test and Evaluation |
| **(U) IOT&E** | Initial Operational Test and Evaluation |
| **(U) KPP** | Key Performance Parameter |
| **(U) NAVAIR** | Naval Air Systems Command |
| **(U) OPTEVFOR** | Operational Test and Evaluation Force |
| **(U) PMA-231** | E-2/C-2 Airborne Command & Control Systems Program Office |
| **(U) VCD** | Verification of Correction of Deficiencies |


INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
INTEGRITY
EFFICIENCY

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## U.S. Department of Defense

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## For more information about DoD OIG reports or activities, please contact us:

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