

**Audit**



**Report**

OFFICE OF THE INSPECTOR GENERAL

C-2A FLIGHT SIMULATOR TRAINING DEVICE

Report No. 97-093

February 14, 1997

Department of Defense

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February 14, 1997

**MEMORANDUM FOR ASSISTANT SECRETARY OF THE NAVY  
(FINANCIAL MANAGEMENT AND COMPTROLLER)**

**SUBJECT: Audit Report on C-2A Flight Simulator Training Device  
(Report No. 97-093)**

We are providing this audit report for your information and use. This report is one in a series of reports about training simulators. This report addresses flight simulator deficiencies at the Airborne Early Warning Wing, U.S. Pacific Fleet, at Naval Air Station Miramar, California. We considered management comments on a draft of this report in preparing the final report.

Management comments on a draft of this report conformed to the requirements of DoD Directive 7650.3 and left no unresolved issues. Therefore, no additional comments are required.

We appreciate the courtesies extended to the audit staff. Questions on the audit should be directed to Mr. Raymond A. Spencer, Audit Program Director, at (703) 604-9071 (DSN 664-9071) or Mr. David F. Vincent, Audit Project Manager, at (703) 604-9058 (DSN 664-9058). See Appendix C for the report distribution. The inside back cover lists the audit team members.

*David K. Steensma*

David K. Steensma  
Deputy Assistant Inspector General  
for Auditing

## Office of the Inspector General, DoD

Report No. 97-093  
(Project No. 5AB-0070.02)

February 14, 1997

### C-2A Flight Simulator Training Device

#### Executive Summary

**Introduction.** The mission of the Airborne Early Warning Wing, U.S. Pacific Fleet, at Naval Air Station Miramar, California, is to provide administrative and training support to Pacific Fleet E-2C Hawkeye squadrons and C-2A Greyhound squadrons. Support includes scheduling training, aircraft maintenance support, aircraft distribution management and logistics, and training and readiness program oversight.

**Audit Objective.** The overall audit objective was to evaluate the acquisition process for training simulators and devices. The E-2C Hawkeye and C-2A Greyhound operational flight trainers were 2 of 30 programs that we reviewed. Management controls for training and simulator devices will be addressed in the overall report.

**Audit Results.** The Airborne Early Warning Wing did not have a C-2A Greyhound operational flight trainer. As a result, C-2A Greyhound flight crews committed errors during actual flight emergencies. The recommendation in this report, if implemented, will help to improve training and readiness support at the Airborne Early Warning Wing, U.S. Pacific Fleet.

**Summary of Recommendation.** We recommend reevaluating the decision to delete C-2A Greyhound operational flight trainer funding.

**Management Comments.** The Navy concurred with the recommendation in the draft report. The Navy stated that a west coast C-2A Greyhound operational flight trainer is fully funded in the FY 1998 President's budget request. See Part I for a summary of management comments and Part III for the complete text of the comments.

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## **Part I - Audit Results**

### Audit Background

The mission of the Airborne Early Warning Wing, U.S. Pacific Fleet (the Warning Wing), at Naval Air Station Miramar, California, is to provide administrative and training support to Pacific Fleet E-2C Hawkeye squadrons and C-2A Greyhound squadrons. Support includes scheduling training, aircraft maintenance support, aircraft distribution management and logistics, and training and readiness program oversight.

Operational flight trainers imitate the functional and physical characteristics of operational aircraft for training purposes. They instill habits and decrease reaction time to a given situation and imitate the functional and physical characteristics of operational aircraft. Operational flight trainers provide a capability for training in cockpit familiarization, cockpit preflight, engines start and shutdown, aircraft operation in normal and emergency conditions, and post flight procedures. In addition, operational flight trainers provide instructors with the capability of selecting desired environmental parameters and introducing aircraft equipment malfunctions, as required, to simulate problem situations. Operational flight trainers are required to be designed and developed as part of operational weapon systems.

DoD Directive 1430.13, "Training Simulators and Devices," August 22, 1986, establishes training simulator development, acquisition, and utilization policy. DoD Directive 1430.13 also authorizes the Department of Defense to use training simulators and devices to make training systems more effective and to help maintain military readiness. DoD Directive 1430.13 also requires concurrent development of weapon systems and training systems.

### Audit Objective

The overall audit objective was to evaluate the acquisition process for training simulators and devices. The E-2C Hawkeye and C-2A Greyhound operational flight trainers were 2 of 30 programs that we reviewed. Another objective was to evaluate applicable management controls. See Appendix A for a discussion of the scope and methodology of the audit, for a discussion of management controls as they applied to the overall audit objective, for a summary of prior audit coverage related to the issues addressed in this report. Appendix B discusses issues concerning delays in the delivery of the E-2C Hawkeye operational flight trainer and weapon systems trainer.

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## **C-2A Flight Simulator Training Device**

The Warning Wing did not have a C-2A Greyhound operational flight trainer because the Navy deleted C-2A Greyhound operational flight trainer funding. As a result, C-2A Greyhound flight crews committed errors during actual flight emergencies, and use of C-2A Greyhound aircraft instead of a C-2A Greyhound operational flight trainer to provide flight crew training was not cost-effective.

### **General Characteristics**

The primary mission of the C-2A Greyhound is to provide logistics support to the fleet. The C-2A Greyhound transports personnel, key logistics items, mail, and similar items between shore facilities and carrier task forces at sea. The C-2A Greyhound, whose basic airframe is that of the E-2C Hawkeye, is the principal aircraft used for logistics support to the fleet and can deliver 5 tons of cargo 1,000 thousand miles to a carrier at sea.

### **C-2A Greyhound Trainer**

The Warning Wing did not have a C-2A Greyhound operational flight trainer. At the Warning Wing, C-2A Greyhound flight crews periodically used the E-2C Hawkeye operational flight trainer for training purposes. However, while the E-2C Hawkeye and the C-2A Greyhound aircraft share a common airframe, C-2A Greyhound flight crews stated that the E-2C Hawkeye operational flight trainer was ineffective for training C-2A flight crews because of differences between the two aircraft. They further stated that the E-2C Hawkeye operational flight trainer cockpit was "difficult and not user friendly, thus making it difficult to practice . . . ." Some of the differences between the E-2C Hawkeye and the C-2A Greyhound aircraft are as follows:

- o engine limits,
- o engine instrumentation,
- o instrument navigation equipment,
- o circuit breaker placement,
- o common equipment location,
- o scan pattern during instrument landing conditions at nighttime,

## C-2A Flight Simulator Training Device

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- o aeronautical flight characteristics, and
- o emergency flight procedures.

## Funding

On September 18, 1996, we discussed the Warning Wing operational flight trainer deficiencies with officials of the Aviation Training Requirements Branch, who informed us that the Deputy Chief of Naval Operations (Resources, Warfare Requirements, and Assessments) deleted funding to provide for a C-2A Greyhound operational flight trainer for the Warning Wing from the FY 1998 Program Objective Memorandum budget submission. Documentation showed that, as a result of 10-percent reductions to training device accounts, the Navy deleted the total \$4.5 million cost for the C-2A Greyhound operational flight trainer. As early as FY 1994, the Warning Wing has sought funding to correct its C-2A operational flight trainer deficiencies. As in that most recent instance, C-2A operational flight trainer funding has not been granted.

## Training and Cost Effectiveness

The use of operational C-2A Greyhound aircraft, as opposed to an operational flight trainer, to provide flight crew training was not cost-effective. The Warning Wing estimated that an operational flight trainer cost per flight hour was \$200, compared with \$2,200 per flight hour for C-2A Greyhound aircraft. Moreover, the lack of a C-2A Greyhound operational flight trainer hindered flight crews' capability to practice emergency procedures. As a consequence, C-2A Greyhound flight crews committed errors during actual flights. Documentation showed that errors committed by flight crews during actual flight emergencies might have been prevented if a C-2A Greyhound operational flight trainer were available, thus affording flight crews opportunities to practice emergency flight procedures. A Fleet Logistics Support Squadron 50 memorandum states, in part, that:

. . . the [flight crew] allowed a benign malfunction, whether actual or otherwise, to distract them from their most important task - fly the aircraft. Two qualified aircraft commanders intent on following a [Naval Aviation Training and Operating Procedures] checklist failed to adjust their pattern to accommodate a landing abnormality and forced them to rush through the published procedures. The squadron immediately recognized the potential impact of the series of events which led to this mishap. This mishap . . . might have been prevented if [C-2A Greyhound operational flight trainer] training had been available.

Additionally, a February 1, 1994, C-2A Operational Advisory Group Action memorandum states, in part, that:

There is no C-2A [Greyhound operational flight trainer] on the west coast . . . . There is presently no way to conduct Emergency Procedures and [Automated Carrier Landing System] training in the safe environment a simulator allows. . . . C-2A [mishap] listed lack of training, specifically lack of [C-2A Greyhound operational flight trainer] . . . as a causal factor.

The Deputy Chief of Naval Operations should allocate funding for the Warning Wing C-2A operational flight trainer in its FY 1998 Program Objective Memorandum budget submission. If implemented, the recommendation in this report will help to improve training and readiness support at the Warning Wing.

## **Recommendation, Management Comments, and Audit Response**

We recommend that the Deputy Chief of Naval Operations (Resources, Warfare Requirements, and Assessments) reevaluate the decision to delete funding for the C-2A Greyhound operational flight trainer from the FY 1998 Program Objective Memorandum.

**Management Comments.** The Navy concurred and stated that a west coast C-2A Greyhound operational flight trainer is fully funded in the FY 1998 President's budget request.

## **Part II - Additional Information**

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## Appendix A. Scope and Methodology

### Scope

We discussed issues related to the effectiveness of flight simulator training devices with Navy and Air Force personnel. We evaluated the concurrence<sup>1</sup> of the E-2C Hawkeye and the C-2A Greyhound operational flight trainer at the Warning Wing. Additionally, we reviewed training practices for aircraft assigned to the Warning Wing. We also reviewed FY 1994 through FY 1996 reports and memorandums on squadron readiness, FY 1992 and FY 1996 reports on flight mishap incidents, and FY 1996 through FY 2002 funding documents. The scope of the audit was limited in that we did not review the management control program for the aircraft. Management controls for training simulators and devices will be addressed in the overall report.

**Contacts During the Audit.** We visited the Airborne Early Warning Wing, U.S. Pacific Fleet, Naval Air Station Miramar, California, and the 23rd Wing, Pope Air Force Base, North Carolina. Further details are available on request.

### Audit Period and Standards

We performed this economy and efficiency audit from September 1995 through October 1996 in accordance with auditing standards issued by the Comptroller General of the United States, as implemented by the Inspector General, DoD. We did not rely on computer-processed data or statistical sampling procedures to perform the audit.

### Prior Audits and Other Reviews

Inspector General, DoD, Report No. 92-002, "Operation and Modification of Flight Simulator Training Devices," October 9, 1991, states that flight simulators were not modified concurrently with changes to operational aircraft. The report also states that the Services were not evaluating the effectiveness of training. The report made no recommendations.

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<sup>1</sup>Concurrency is attained when the function and operation of the training system matches the supported weapon system.

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## **Appendix B. Other Matter of Interest**

The E-2C Hawkeye operational flight trainer at the Warning Wing was not fully concurrent with the aircraft that it simulated. The operational flight trainer was not fully concurrent because of contractual and technical problems that delayed delivery schedules. As a result, the lack of the most current trainer adversely affected squadron readiness and training at the Warning Wing.

### **General Characteristics**

The E-2C Hawkeye provides all-weather airborne early warning and command and control functions for the carrier battle group. Additional missions include surface surveillance coordination, strike and interceptor control, search and rescue guidance, and communications relay services. Some of the capabilities of the Group II version E-2C Hawkeye include, but are not limited to:

- o AN/APS-145 radar,
- o improved identification friend or foe,
- o an enhanced high speed processor,
- o enhanced main display units,
- o a joint tactical information distribution system, and
- o a global positioning system.

In comparison with the Group 0/I version E-2C Hawkeye, the Group II version increases:

- o radar and identification friend or foe range by 40 percent,
- o radar volume by 96 percent,
- o target track capability by 200 percent,
- o number of targets displayed by 1,000 percent, and
- o target recognition capability through the use of color displays.

## E-2C Hawkeye Trainer

The E-2C Hawkeye operational flight trainer was not fully concurrent with the aircraft that it simulated. Specifically, the E-2C Hawkeye operational flight trainer was the Group 0/I version. However, the Warning Wing E-2C Hawkeye squadrons have been flying the Group II version aircraft since the early 1990s. As a result, documentation showed that the lack of a Group II version operational flight trainer adversely affected the Warning Wing's readiness and training. Specifically, the Group 0/I version operational flight trainer lacked two key Group II version elements:

- o a global positioning system and
- o a multifunction control data unit.

Also, the Warning Wing lacked a Group II version E-2C Hawkeye weapon systems trainer. According to a Warning Wing memorandum, March 10, 1994, to the Commander, Naval Air Force, U.S. Pacific Fleet:

The west coast E-2 community lacks a compatible weapon systems trainer to train Group II Naval Flight Officers . . . . The lack of a compatible weapon systems trainer is beginning to adversely impact squadron turnaround training and readiness.

The memorandum further states, in part, that:

The lack of a Group II [weapon systems trainer] on the west coast requires Group II equipped squadrons to conduct the majority if not all training in the aircraft.

Similarly, a Carrier Airborne Early Warning Squadron 113 memorandum, April 23, 1996, states, in part, that:

. . . a [weapon systems trainer] would provide an environment where scenarios could be halted to discuss learning points or to examine significant situations. Failure to [obtain a weapon systems trainer] will result in reduced readiness levels at greater overall expense to the taxpayer.

## Schedule Delays

The officials of the Aviation Training Requirements Branch, Office of the Deputy Chief of Naval Operations, informed us that the Warning Wing's lack of a Group II version operational flight trainer and weapon systems trainer were the result of contractual and technical problems. Specifically, the Warning Wing was to receive the third Group II version operational flight trainer and weapon systems trainer after the contractor had completed the first and second Group II version operational flight trainer and weapon systems trainer for the

## Appendix B. Other Matter of Interest

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East Coast E-2C Hawkeye squadron, located at Norfolk, Virginia. Contractual and technical problems delayed delivery of the Norfolk squadron's Group II version operational flight trainers and weapon systems trainers which, in turn, delayed the delivery of the third Group II version operational flight trainer and weapon systems trainer to the Warning Wing.

For example, an August 3, 1996, Aviation Training Requirements Branch memorandum on the status of the Norfolk squadron's E-2C Hawkeye operational flight trainers and weapon systems trainers states, in part, that:

The Group II version operational flight trainer [delivery date] has slid an additional six months to December 1996 in order for [a modification] to be installed and tested in plant. 55 Discrepancy Reports [relating to the Group II version operational flight trainer] remain open.

The memorandum further states:

The E-2C Group II weapon systems trainer has been delivered to VAW [Attack, All-Weather Aircraft Squadron] -120. The [weapon systems trainer] is undergoing acceptance testing and is expected to be [operational] by 31 August 1996 due to the number of outstanding minor [Discrepancy Reports]. The [E-2C Group II weapon systems trainer] is 18 months behind the original [operational] date. The contract has been modified twice since the original scheduled [operational] date.

Similarly, another Aviation Training Requirements Branch memorandum on the status of the Norfolk squadron's E-2C Hawkeye Group II weapon systems trainer, March 25, 1996, states, in part, that:

The E-2C Group II weapon systems trainer, originally scheduled [for delivery in] December 1994, was delivered in December 1995, one year behind schedule. Simulator is in place at VAW-120, undergoing acceptance testing. *VAW-120 will not accept the trainer until the contractor meets system specifications [emphasis added]* . . . . These delays will have an impact on the [delivery date] of the west coast weapon systems trainer . . . .

Lack of a Group II version E-2C Hawkeye operational flight trainer and weapon systems trainer has adversely affected the Warning Wing's readiness and training. The E-2C Hawkeye operational flight trainer was ineffective for team<sup>3</sup> training because it lacked a weapon systems trainer. As a result, completion of all training requirements required extensive coordination and use of operational aircraft. For example, to meet Group II syllabus training requirements, Group II Naval Flight Officers receive Group 0/I training through the battle problems

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<sup>3</sup>The E-2C Hawkeye flight crew will normally consist of a pilot, copilot, combat information center officer, aircraft control officer, and radar officer. Team training refers to the combat information center officer, aircraft control officer, and radar officer working together to detect, identify, and track long range threats to the carrier battle group.

phase. Naval Flight Officers then receive an additional 8-week Group II transition course, which includes an additional eight 2.5-hour flights. A March 1994 Warning Wing memorandum states, in part, that:

Lack of a Group II [weapon systems trainer] on the west coast requires Group II equipped squadrons to conduct the majority if not all training in the aircraft. This limits training capability . . . . The [weapon systems trainer] is the most cost effective and sometimes the only method of assembling external assets to simulate various battle-problem options.

Additionally, according to an April 1996 Carrier Airborne Early Warning Squadron 113 memorandum:

. . . the support of E-2C specific training (providing multiple airborne targets for overland tracking, having entire battle groups go into emissions control, etc.) . . . is not an efficient use of tax dollars.

## Conclusion

The officials informed us that the Warning Wing Group II version weapon systems trainer and operational flight trainer were fully funded and that the amended delivery dates were August 1997 and April 1998, respectively. Because the Navy has recognized and continues to address the contractual and technical problems that delayed the Warning Wing operational flight trainer and weapon systems trainer, our report makes no recommendations to address those problems.

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## **Appendix C. Report Distribution**

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House Subcommittee on National Security, Committee on Appropriations  
House Committee on Government Reform and Oversight  
House Subcommittee on National Security, International Affairs, and Criminal Justice,  
Committee on Government Reform and Oversight  
House Committee on National Security

## **Part III - Management Comments**

# Department of the Navy Comments



DEPARTMENT OF THE NAVY  
OFFICE OF THE ASSISTANT SECRETARY  
RESEARCH, DEVELOPMENT AND ACCOUNTION  
1400 NAVY PENTAGON  
WASHINGTON DC 20380-1400

27 JAN 1997

MEMORANDUM FOR THE DEPARTMENT OF DEFENSE ASSISTANT INSPECTOR  
GENERAL FOR AUDITING

Subj: DRAFT REPORT ON THE AUDIT OF C-2A FLIGHT SIMULATOR  
TRAINING DEVICE (PROJECT NO. 5AB-0070.02) - ACTION  
MEMORANDUM

Ref: (a) DODIG Memo of 07 Nov 96

Encl: (1) DON Response to Draft Audit Report

I am responding to the draft audit report forwarded by  
reference (a) concerning the acquisition process and management  
controls for C-2A flight simulators.

The Department of the Navy's response is provided at Encl.  
(1). We generally agree with the draft report conclusions and  
recommendation. As outlined in the enclosed comments, the  
Department is planning to take specific actions to address the  
funding of a West Coast C-2A Operational Flight Simulator.

  
WILLIAM J. SCHAEFER

**Department of the Navy Response  
to  
DODIG Draft Report of November 07, 1996  
on  
C-2A Flight Simulator Training Device  
Project No. 5AB-0070.02**

**Conclusion**

The use of operational C-2A Greyhound aircraft to provide flight crew training, as opposed to an operational flight trainer, was not cost-effective. The Warning Wing estimated that an operational flight trainer cost per flight hour was \$200, compared with \$2,200 per flight hour for C-2A Greyhound operational flight trainer. Moreover, the lack of a C-2A Greyhound operational flight trainer hindered flight crews' capability to practice emergency procedures. As a consequence, C-2A Greyhound flight crews committed errors during actual flights. The Deputy Chief of Naval Operations should allocate funding for the Warning Wing C-2A operational flight trainer in its FY 1998 Program Objective Memorandum budget submission. If implemented, the recommendation in this report will help to improve training and readiness support at the Warning Wing.

**Recommendation for Corrective Action**

We recommend, in light of the flight crew mishaps that were attributable to a lack of a C-2A operational flight trainer and the uneconomical cost per flight hour in using actual C-2A aircraft to provide flight crew training, that the Deputy Chief of Naval Operations (Resources, Warfare Requirements, and Assessments) reevaluate the decision to delete funding for the C-2A operational flight trainer from the FY 1998 Program Objective Memorandum.

**DOM Position**

We concur with the conclusion that the lack of a West Coast C-2A Operational Flight Trainer hinders flight crew capabilities to practice emergency procedures. We also agree that C-2A Operational Flight Trainer time is significantly less expensive than actual C-2A flight time. In response to the recommendation, a West Coast C-2A Operational Flight Trainer is fully funded in the Fiscal Year 1998 President's budget request.

ENCLOSURE (1)

## **Audit Team Members**

This report was produced by the Acquisition Management Directorate,  
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