Audit Report

OFFICE OF THE INSPECTOR GENERAL

ADVANCED MEDIUM RANGE AIR-TO-AIR MISSILE

Report Number 92-056

March 4, 1992

Department of Defense

INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202-2884

March 4, 1992

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

SUBJECT: Audit Report on the Advanced Medium Range Air-to-Air Missile (Report No. 92-056)

We are providing this report for your information and use. Comments on a draft of this report were considered in preparing the final report. During the audit, we issued a Quick-Reaction Report concerning the feasibility of component breakout for the Advanced Medium Range Air-to-Air Missile program.

DoD Directive 7650.3 requires that all audit recommendations be resolved promptly. Therefore, the Deputy Assistant Secretary of the Air Force (Acquisition) must provide final comments on the unresolved recommendations and monetary benefits by May 4, 1992. See the "Status of Recommendations" section at the end of each finding for the unresolved recommendations and the specific requirements for these comments. If appropriate, you may propose alternative methods for accomplishing desired improvements. Recommendations and potential monetary benefits are subject to resolution in accordance with DoD Directive 7650.3 in the event of nonconcurrence or failure to comment. We also ask that your comments indicate concurrence or nonconcurrence with the internal control weaknesses highlighted in Part I.

The courtesies extended to the audit staff are appreciated. If you have any questions on this audit, please contact Mr. John Meling, Program Director, at (703) 614-3994 (DSN 224-3994) or Mr. Roger Florence, Project Manager, at (703) 693-0489 (DSN 223-0489). The distribution of this report is listed in Appendix G.

Robert J. Lieberman
Assistant Inspector General
for Auditing

Enclosures

cc:
Secretary of the Navy
Secretary of the Air Force

Office of the Inspector General

AUDIT REPORT NO. 92-056 **March 4, 1992**
(Project No. 0AS-0072)

ADVANCED MEDIUM RANGE AIR-TO-AIR MISSILE

EXECUTIVE SUMMARY

Introduction. The Advanced Medium Range Air-to-Air Missile (AMRAAM) is a joint Air Force and Navy program with an estimated cost of about $13.1 billion (then-year dollars) for 15,500 missiles. The missile has been in development and limited production since the mid-1970's, with the Air Force designated as the lead agency. The Air Force is using a leader/follower acquisition strategy in an attempt to reduce missile cost through competition. The Air Force sought a full-rate production decision from the Defense Acquisition Board in May 1991 but was directed to stay in low-rate initial production until all test certifications were made.

Objective. The audit objective was to evaluate the effectiveness of the acquisition management of the AMRAAM program to determine if the system was being adequately readied for production and deployment. We also reviewed associated internal controls.

Audit Results. We found no deficiencies in five of the eight program management elements we reviewed. The audit disclosed five reportable conditions in the three other program management elements.

o The AMRAAM program office had not established effective configuration control over the missile rail launcher design. As a result of launcher design problems, the Air Force missed out on planned competition savings that amounted to $39 million and may miss out on another $1.9 million in competition savings (Finding A).

o The AMRAAM program office had not established effective internal controls over the missile software development. As a result, Hughes Aircraft Company had not provided complete missile software documentation until 3 years after contractually required to deliver it (Finding B).

o Hughes Aircraft Company was granted relief from delivery schedule and technical specification requirements without providing the Government consideration. As a result of extending the delivery schedule, Air Force costs on the subsequent missile

contract increased by an estimated $8 million because of additional inflation costs. Also, the program office did not receive consideration in return for granting 199 major deviations and waivers to system technical specifications (Finding C).

o The AMRAAM program office acquisition strategy to verify interchangeability between Hughes and Raytheon missile components was not cost-effective. As a result, the Air Force could cancel the planned interchangeability configuration audit demonstration, costing about $4.4 million, and reduce interim contractor support costs through competition (Finding D).

o The AMRAAM program office was not properly identifying and reporting contractor support services and was using contractors to satisfy 49 percent of program office staffing requirements. As a result, contractor support services were not subject to congressional restrictions, and extended reliance on contractors may not be appropriate or cost-effective (Finding E).

Internal Controls. The report identified material internal control weaknesses in that Hughes Aircraft Company was making missile rail launcher design changes without obtaining approval from the AMRAAM program office (Finding A). Also, the AMRAAM program office did not obtain consideration from Hughes Aircraft Company in exchange for relief granted to delivery schedule and technical specification requirements (Finding C). Additional details are provided in Part I of this report.

Potential Benefits of Audit. The Air Force should obtain consideration from Hughes Aircraft Company in exchange for approving missile delivery schedule extensions. However, the amount cannot be determined until the AMRAAM program office identifies the causes of missile delays to negotiate equitable consideration with the contractor. We also estimated that the Air Force could save about $4.4 million by demonstrating missile interchangeability through competing interim contractor support. Additional details are included in Appendix E.

Summary of Recommendations. We recommended that program configuration controls be strengthened, consideration for approving delivery schedule changes be obtained, and interim contractor support be competed. We also recommended that contractor support services be reported as contracted advisory and assistance services and the appropriateness and cost-effectiveness of AMRAAM program office reliance on support contractors be determined.

Management Comments. The Deputy Assistant Secretary of the Air Force concurred with Recommendations A.2., A.3., B.1., C.2.,

C.3., and D.2. The Deputy Assistant Secretary nonconcurred with Recommendations A.1., B.2., C.1., D.1., E.1., and E.2.

Audit Response. Management comments were nonresponsive to recommendations made in Finding C. As of March 1991, the AMRAAM program office had not documented the reasons for late missile deliveries on production lots 1 through 3 or obtained monetary consideration from Hughes in return for approving delivery waivers. Management comments were also nonresponsive to recommendations made in Finding D. We question management's contention that it was not low risk to compete interim contractor support since the Air Force claimed that program risks were low for proceeding with full-rate production of the AMRAAM at the May 1991 Defense Acquisition Board meeting. Although management comments were also nonresponsive to recommendations made in Finding E., the revised draft DoD Directive 4205.2, "DoD Contracted Advisory and Assistance Services," will explicitly require that the program office implement our report recommendations.

We request that the Deputy Assistant Secretary of the Air Force (Acquisition) provide additional comments to the final report by May 4, 1992. The full discussion of the responsiveness of management comments is included in Part II of the report, and the complete text of the management comments and the audit response to management's comments on the factual content of the report is included in Part IV of the report.

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This report was prepared by the Acquisition Management Directorate, Office of the Assistant Inspector General for Auditing, DoD. Copies of the report can be obtained from the Information Officer, Audit Planning and Technical Support Directorate, (703) 693-0340.

PART I - INTRODUCTION

Background

The Advanced Medium Range Air-to-Air Missile (AMRAAM) is a joint Air Force and Navy program that was started in the mid-1970's to develop an all weather missile to replace the Sparrow missile. As the lead agency for this joint program, the Air Force is responsible for development and production of the missile, the missile rail launcher, and the associated training and support equipment. The AMRAAM is being developed to meet medium range air-to-air missile requirements of the United States and its European allies through FY 2005. The missile is to be compatible with the F-14, F-15, F-16, and F/A-18 aircraft and is planned for use on the Advanced Tactical Fighter. The AMRAAM allows the pilot to take evasive maneuvers immediately after missile launch, a capability that the Sparrow missile does not have. The AMRAAM is also operated within and beyond visual range of its target with a high probability of neutralizing enemy aircraft.

Acquisition strategy. In 1982, during full-scale development, the Air Force selected a leader/follower acquisition strategy because of rising missile costs. The Air Force believes that this strategy has provided competition during the AMRAAM production and therefore reduces the missile's cost. This acquisition strategy requires that the missile developer (the leader) show another contractor (the follower) how to build the missile. Once the follower can produce the missile, the leader and follower will compete for subsequent missile production contracts. Hughes Aircraft Company, Missile Systems Group (Hughes), is the leader, and Raytheon Company, Missile Systems Division (Raytheon), is the follower.

Procurement history. The Air Force and Navy plan to procure 12,000 and 3,500 missiles, respectively. Since the AMRAAM entered into low-rate initial production in 1986, four low-rate initial production contracts have been awarded (production lots 1 through 4). In April 1991, the Air Force initiated action to obtain production cost proposals for production lot 5 from the two prime contractors. Lot 5 requirements will be a competitive procurement between the two producing contractors. As of May 1991, the Air Force had contracted for 2,409 missiles. (After the conclusion of our audit, the Air Force awarded production lot 5 for 810 missiles.)

On May 23, 1991, the Defense Acquisition Board (DAB) evaluated the AMRAAM's readiness for full-rate production. The DAB rejected the Air Force's request for approval to immediately

enter into full-rate production. The DAB stated that the program could enter into full-rate production once the required certification of test results was made by the Director, Operational Test and Evaluation. Total projected AMRAAM costs for 24,000 missiles have increased by 24 percent from the congressionally set ceiling of $7.6 billion (in FY 1984 dollars) to an estimated cost of $9.4 billion (in FY 1984 dollars). Procurement will continue through the late 1990's.

Objective

The audit objective was to evaluate the effectiveness of the acquisition management of the AMRAAM program to determine if the system was being adequately readied for production and deployment. In performing the audit, we reviewed eight program management elements, including:

- configuration management;
- cost and schedule assessments;
- weapon system integration;
- reliability, availability, and maintainability;
- contracting;
- integrated logistics support planning;
- program stability; and
- dual source planning.

We also reviewed internal controls related to these elements. Our audit tests identified no deficiencies in the following elements.

o Cost and schedule assessments. We reviewed Raytheon Cost/Schedule Control System Criteria reports and took no exception to the evaluation performed by the program office. Cost/Schedule Control System Criteria were not applicable to Hughes' firm-fixed-price production contracts.

o Weapon system integration. We found that the AMRAAM Interface Control Working Group had adequately reviewed proposed changes to the missile design and taken necessary corrective actions.

o Reliability, availability, and maintainability. We concluded that the program office was taking the corrective actions necessary to improve the missile's reliability. In addition, the General Accounting Office (GAO) was monitoring the Air Force's reliability improvement program.

o Program stability. We found that the program properly reported conditions that affected the program stability.

o Dual source planning. The program office had developed a second source acquisition plan that was directed at the prime contractor to promote competition. Although the benefits of dual sourcing may not fully accrue because of the reduced missile requirements, further review was not warranted because the Air Force had already established Raytheon as the second source contractor at a cost of about $90 million.

The results of our review of the remaining three program management elements are addressed in Part II of this report.

Scope

This economy and efficiency audit was conducted from June 1990 through May 1991 in accordance with auditing standards issued by the Comptroller General of the United States as implemented by the Inspector General, DoD, and accordingly included such tests of internal controls as were considered necessary. We reviewed accounting and program data for the period January 1987 through April 1991 to support the audit. We also interviewed personnel involved in the acquisition of the AMRAAM. A list of the activities visited or contacted is in Appendix F.

We obtained the assistance of the Technical Assessment and Quantitative Methods Divisions of the Office of the Assistant Inspector General for Auditing in the area of contract consideration and in calculating the additional inflation costs caused by the missile delivery slippages.

Internal Controls

Internal controls were reviewed as were deemed necessary for the eight program management elements addressed during the audit. Internal controls for program funding, engineering change proposals, system threat analyses, contract requirements, integrated logistics support, software management, and program office staffing were reviewed. The audit identified material internal control weaknesses as defined by Public Law 97-255, Office of Management and Budget Circular A-123, and DoD Directive 5010.38. Controls were not effective to ensure that Hughes obtained approval from the AMRAAM program office before making design changes to the missile rail launcher. Also, controls were not effective to ensure that the AMRAAM program office obtained consideration from Hughes in exchange for relief granted to AMRAAM delivery schedule and technical specification requirements. Recommendations A.1. and C.1. in this report, if

implemented, will correct these weaknesses. A copy of this final report is being provided to the senior official responsible for internal controls within the Air Force.

Prior Audits and Other Reviews

Since 1985, the AMRAAM program has been the subject of five audits performed by GAO; the Inspector General, DoD; and the Air Force Audit Agency that were directly related to our audit objectives. Appendix A discusses the prior audits.

Other Matters of Interest

During the audit, we issued a Quick-Reaction Report and identified an area of concern in cost estimating that did not warrant a finding and recommendations because it was too late to take corrective action.

Component breakout. The Inspector General, DoD, issued Report No. 91-061, "Quick-Reaction Report on Component Breakout of the Advanced Medium Range Air-to-Air Missile Program," on March 14, 1991. This report was provided to alert management of the need to discuss component breakout at the DAB meeting held on May 23, 1991, to consider the Air Force's request to proceed to full-rate production for the AMRAAM. The report identified nine missile components whose design and manufacturing processes were sufficiently stable for component breakout. We estimated that savings of $312 million could be achieved during the remaining missile buys without unduly increasing program risk through component breakout. The program office conducted an in-depth component breakout study and concluded that component breakout is not feasible because either component designs are not stable or component quality, reliability, performance, and timely delivery would be jeopardized.

Cost estimating. United States Code, title 10, section 2434, "Independent Cost Estimates; Operational Manpower Requirements," requires an independent estimate of the cost of a major Defense acquisition program before the Secretary of Defense may approve a program for full-scale development or production. Further, section 2434 states that the independent estimate must include all life-cycle costs, including research and development, procurement, operations and support, and any related military construction. The purpose of an independent cost estimate is to test the reasonableness of the program office estimate. DoD Instruction 5000.2-M, "Defense Acquisition Management Policies and Procedures," February 23, 1991, requires that the program office and the independent estimators estimate total life-cycle costs, regardless of funding source or management control.

The AMRAAM program office excluded $719.6 million (in 1984 dollars) from the cost estimate submitted to support the May 1991 DAB meeting. The program office excluded $645 million associated with Air Force aircraft integration, $15 million for modification of the aircraft simulator, $17.2 million for Navy missile improvements, and $42.4 million for military construction costs. The AMRAAM Program Director excluded these costs because he decided to estimate only costs directly associated with the program or did not recognize all potential life-cycle costs. These costs were included in the independent cost estimate. Since the independent cost estimate was also provided to the DAB, no audit recommendations were warranted in this report.

PART II - FINDINGS AND RECOMMENDATIONS

A. Missile Rail Launcher Configuration Control

The AMRAAM program office had not established effective configuration control over the missile rail launcher design. Program office controls were ineffective because they allowed Hughes to change the launcher design without program office review and approval, established the launcher design baseline before adequate level 3 engineering drawings were available, and did not coordinate the engineering data management plan as required. As a result of missile rail launcher design problems, the Air Force missed out on planned competitive procurement savings of about $39 million and because of drawing problems may miss out on another $1.9 million in competition savings.

DISCUSSION OF DETAILS

Background

Military Specification 1000B, "Drawings, Engineering and Associated Lists," October 1977, establishes uniform policies and guidance for obtaining system design documentation. A system's design is identified by different detail levels of engineering documents. The kind and level of detail contained in the documents depend on the planned reprocurement method and the logistic support requirements for the system. Level 3 engineering drawings are the most detailed drawings and are acquired to support competitive procurements. The drawings are to include sufficient engineering detail to enable a competent manufacturer to build the system or component.

A system design baseline is established when the design is formally designated and fixed by the program office as a reference point for subsequent design changes. Military Standard 480B, "Configuration Control-Engineering Changes, Deviations and Waivers," July 1988, and Air Force Regulation 14-1, "Configuration Management," December 1988, establish configuration control procedures for processing and implementing system design changes after the baseline is established. Configuration control is a means of ensuring that a system's design is accurate and current throughout its life cycle. The Air Force Regulation requires that system design changes made after the baseline is established be reviewed and approved by the program office's configuration control board. A Class I change affects the performance and/or design, while a Class II change does not affect performance or design and may consist of drawing changes or computer listings.

Configuration Control

The program office had not established effective controls over the missile rail launcher design configuration because it allowed Hughes to change the design without program office review and approval, approved the launcher design baseline before adequate level 3 engineering drawings were available, and did not coordinate the engineering data management plan as required.

Design changes. After production lot 2, the program office allowed Hughes to change the launcher design without the configuration control board's review and approval. This is contrary to review and approval requirements in Air Force Regulation 14-1. For example, Hughes changed the material used in making the supports on the launcher from titanium to aluminum without submitting the design change to the program office for approval. Hughes changed the material to make the launcher supports compatible with the launcher rails, which were made with aluminum. Aluminum and titanium are not compatible with each other. Although we are not taking exception with this design change, Hughes' unauthorized design changes affect configuration control. In our opinion, it is essential that the program office maintain adequate configuration control over the missile rail launcher design to preclude interoperability problems between launchers produced by Hughes and United Telecontrol Electronics, Incorporated, and missiles produced by Hughes and Raytheon.

Baseline documentation. The program office established the launcher baseline design before Hughes provided the acceptable level 3 engineering drawings that the full-scale development contract required. In response to the requirement, Hughes did submit level 3 drawings for program office review and approval over a 3-year period. Throughout this period, Air Force and Navy officials identified problems with the drawings and advised the contractor that the drawing package did not meet the level 3 standards in Military Specification 1000B and was not adequate for a competitive procurement. Problems identified included discrepancies with drawings, missing drawings, and drawings that did not identify the next higher assembly.

The program office took actions to get Hughes to correct the level 3 drawings, including letters to the contractor and a temporary withholding of contract payments. However, the program office was not successful in obtaining complete and accurate level 3 engineering drawings from Hughes.

Engineering data management plan. Air Force Regulation 800-34, "Engineering Data Acquisition," April 1983, requires that the plan, which is to outline tasks, schedules, and

responsibilities necessary for engineering data preparation, review, audit, inspection, acceptance, and delivery be coordinated with supporting commands. The Air Force's supporting command is responsible for management, engineering configuration control, maintenance, and funding of the launcher after the program office completes the AMRAAM development and production. In addition, the Navy's Pacific Missile Test Center provides advice to the Navy on the development of AMRAAM drawings.

Although required, the program office did not coordinate its engineering data management plan with the Warner-Robins Air Logistics Center (the supporting command). The lack of coordination contributed to the supporting command and the Pacific Missile Test Center disagreeing with the planned performance of the physical configuration audit. Specifically, the disagreement focused on when the launcher would be ready for a physical configuration audit. A physical configuration audit is performed to ensure that the hardware is built in accordance with the drawings. The supporting command stated that it would not be able to support the launcher unless configuration control and data discrepancies were resolved.

Effect on AMRAAM Program

As a result of the launcher design problems, the program office had to delay the planned competitive acquisition of launchers, which would have produced about $39 million in savings and because of drawing problems may miss out on another $1.9 million in competition savings.

Competition delay. The program office planned to issue a competitive launcher production contract for production lot 3. However, because of launcher design problems, the program office was unable to award a competitive contract until production lot 4. On lot 3, the Air Force awarded a sole source contract to procure 2,001 missile rail launchers for $67.9 million (average unit cost of $33,933). Based on competition, the Air Force awarded contracts to Hughes and United Telecontrol Electronics, Incorporated, for lot 4 production quantities. Contracts for lot 4 totaled $31.6 million for 2,191 launchers (average unit cost of $14,422). Accordingly, the lot 4 competition resulted in launcher unit costs being reduced by $19,511 (57 percent) from lot 3 sole source costs. We therefore concluded that the Air Force missed out on an opportunity to save about $39 million (2,001 launchers times $19,511) because the planned lot 3 competitive procurement for the missile rail launcher had to be delayed.

Launcher second source contract. The Air Force may lose an additional $1.9 million in competition savings because the program office competed the launcher procurement before resolving the design and level 3 drawing problems. Complete and accurate level 3 drawings are necessary for other firms to evaluate and prepare cost proposals for launcher production. United Telecontrol Electronics, Incorporated, the second source contractor, reported to the program office that the drawing package was inaccurate and was missing drawings. United Telecontrol Electronics was also concerned that the program office continued to make design changes after contract award. As a result of the incomplete drawings and unstable design, the second source contractor submitted an additional cost claim of $1.9 million to cover the cost of analyzing the drawing package and incorporating design changes.

RECOMMENDATIONS FOR CORRECTIVE ACTION

We recommend that the Program Director for the Advanced Medium Range Air-to-Air Missile program:

1. Issue a letter to Hughes Aircraft Company advising it of the contract requirement to submit all missile launcher engineering changes to the program office's configuration control board for review and approval, as stated in Military Standard 480B.

2. Identify all of the engineering changes that Hughes Aircraft Company made to the launcher design without program office review and approval, and review and approve identified engineering changes in accordance with procedures in Military Standard 480B.

3. Coordinate the engineering data management plan with Warner-Robins Air Logistics Center, as required by Air Force Regulation 800-34, "Engineering Data Acquisition."

MANAGEMENT COMMENTS

The Deputy Assistant Secretary of the Air Force (Acquisition) nonconcurred with Recommendation A.1. stating that Hughes has been, and is, submitting all Class I design changes to the AMRAAM program office's configuration control board for review and approval, as required in Military Standard 480B. He stated that the lot 3 launcher contract statement of work required that Hughes redesign several parts to meet launcher specification requirements. He stated that it was the AMRAAM program office's intent from the outset to allow Hughes the latitude to redesign the parts without Government approval. The AMRAAM program

office's intent was to reestablish the drawings as part of the product baseline at the lot 3 physical configuration audit, which has been accomplished.

The Deputy Assistant Secretary concurred with the intent of Recommendation A.2. by stating that the AMRAAM program office was provided information copies of all launcher design changes made by Hughes. The comments identified that the lot 3 baseline has been established and that all subsequent changes are under the Air Force's control.

The Deputy Assistant Secretary concurred with Recommendation A.3. stating that the AMRAAM program office will coordinate a revised version of the engineering data management plan with Warner-Robins Air Logistics Center. He stated that the AMRAAM program office plans to complete the revised version of the plan in January 1992.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

The Deputy Assistant Secretary's actions to reestablish control over the launcher design baseline satisfied the intent of Recommendation A.1. However, the Deputy Assistant Secretary incorrectly stated that Hughes submitted all Class I launcher design changes to the AMRAAM program office's configuration control board for review and approval, as required in Military Standard 480B. As discussed in the finding, a Pacific Missile Test Center launcher drawing review team and AMRAAM program office personnel identified that Hughes made two Class I launcher design changes without Government approval. The Hughes Class I launcher design changes concerned a change in the type of metal used for the launcher supports and a one-degree taper elimination on the launcher.

Although it may have been the AMRAAM program office's intention from the outset to allow Hughes the latitude to redesign the parts without Government approval, this practice did not conform with requirements in Military Standard 480B and Air Force Regulation 14-1 that the program office control system design changes made after the baseline is established. No additional comments to Recommendation A.1. are requested.

Comments provided by the Deputy Assistant Secretary in response to Recommendations A.2. and A.3. are responsive to the intent of the recommendation, and no additional comments are requested.

MANAGEMENT COMMENTS

The Deputy Assistant Secretary of the Air Force (Acquisition) concurred with Recommendation B.1. stating that the program office has incorporated DoD-STD 2167A into the AMRAAM preplanned product improvement contract. He further stated that DoD-STD 2167A was being incrementally phased into production contracts starting with lot 3.

The Deputy Assistant Secretary nonconcurred with Recommendation B.2. as worded in the draft report. Regardless, he stated that the program office would provide more details on the missile software in the next revision of the Computer Resources Life Cycle Management Plan, which is scheduled for issuance in February 1992.

The Deputy Assistant Secretary also nonconcurred with draft report Recommendation B.3. stating that the process for generating the 95 PROM devices stored outside of missile computer memory was automated with built in check-sums. Accordingly, he stated that little would be achieved by subjecting the 95 PROM devices to an additional review by the independent verification and validation agent.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

We modified the wording of Recommendation B.1. in response to management comments. Planned management actions were responsive to the intent of Recommendation B.1.

Planned management actions satisfy the intent of Recommendation B.2.

We deleted draft Recommendation B.3. from the final report in response to management comments. The recommendation provided for the independent verification and validation of nontactical computer programs. We agree that little would be achieved by subjecting the 95 PROM devices to review by the independent verification and validation agent in view of the process used to generate the devices. No further comments are required in response to the final report.

C. Contract Consideration

The AMRAAM program office did not obtain consideration from Hughes when the program office modified contracts for missile delivery extensions and when the program office approved deviations and waivers to technical specifications. The program office had not analyzed the impact of delivery extensions because of difficulty in identifying causes for late missile deliveries. In regard to deviations and waivers, it was the program office's practice not to obtain consideration if its technical analysis showed that there was no degradation in product performance. As a result, Air Force costs on subsequent missile contracts increased by about $8 million because of delivery extensions. Also, the program office was not compensated for granting Hughes 199 major deviations and waivers to technical specifications.

DISCUSSION OF DETAILS

Background

Contract type. The AMRAAM program office negotiated firm-fixed-price contracts with Hughes for the production of missiles. Federal Acquisition Regulation (FAR), subpart 16.202, "Firm-Fixed-Price Contracts," states that a firm-fixed-price contract is used when performance uncertainties can be identified and reasonable estimates of their cost impact can be made. The program office negotiated firm-fixed-price production contracts because it believed that the technical risk was low and the design was stable. The Government prefers using firm-fixed-price contracts when technical risk is low and the design is stable because it places the risk of nonperformance on the contractor. Accordingly, the contractor is responsible for delivering products on schedule that satisfy the contract's technical specifications at a fixed price.

Contract modifications. The FAR permits modifications to firm-fixed-price contracts when the contracting parties cannot meet contract conditions, such as delivery schedules, system specifications, and technical specifications. FAR, part 43, "Contract Modifications," states that firm-fixed-price contracts can be modified if both parties agree on the modification and some form of consideration is exchanged. Consideration is the exchange of money, the performance of something that was not already required, or the release of a previously established requirement.

Contract deviations and waivers. FAR, subpart 46.407, "Nonconforming Supplies or Services," requires that an equitable price reduction or other consideration be obtained when nonconforming supplies are accepted. Air Force Regulation 14-1, "Configuration Management," December 1988, requires that the program office obtain consideration from the contractor for each approved deviation or waiver. The Air Force Regulation implements Military Standard 480B, "Configuration Control-Engineering Changes, Deviations and Waiver," which requires a total cost analysis of requested changes.

Schedule Extensions

Through contract modifications, the program office extended Hughes' required missile delivery schedules for production lots 1 through 3 without obtaining consideration. The contract modifications vaguely mentioned the possibility of obtaining consideration, but no consideration was obtained when the modifications were issued. In each case, the contract modifications included a provision for later price adjustments. However, the program office's contract records did not document the factors that need to be addressed when consideration is determined.

In reference to Hughes' production contracts, the AMRAAM contracting officer modified the missile delivery schedule for production lot 1 to indicate that Hughes delivered on schedule. The contract was modified 7 months after the delivery of the last missile. We also found that the delivery schedule for production lot 2 was modified to show that Hughes delivered on schedule.

Contract administration. In September 1989, the DoD contract administration representative at Hughes recommended to the AMRAAM program office that Hughes' progress payments be reduced because of late missile deliveries. Reducing progress payments is a contract action used to encourage contractor performance. However, the AMRAAM program office directed the representative to continue full progress payments because "a clear determination of the responsibility for these impacts has not been made."

Hughes' claim. In July 1990, Hughes stated that it may submit a $40 million claim for production delays because of "many Government directed changes." The program office, in subsequent correspondence with Hughes, stated that it took strong exception to Hughes' claim that the Government was responsible for the missile delivery schedule delays. The program office contended that factors other than Government directed changes, such as subcontractor problems and additional testing requirements caused

by missile vibration problems on the F-15 aircraft, contributed to the late deliveries. The program office claimed that the Air Force directed changes benefited Hughes by allowing Hughes additional production time and lessening delays in missile deliveries.

The 1986 Armed Services Pricing Manual provides guidance pertaining to negotiating consideration. The Manual states that the cause of delivery schedule delays should always be determined so that a contractor is not rewarded for poor performance. In our opinion, Hughes' potential claim further illustrates the need to document the reasons for schedules changes.

Effect of late missile deliveries. Our comparison of Hughes' missile deliveries with the original contract schedule showed that lot 2 deliveries had slipped by about 9 months, and lot 3 deliveries were already 8 months behind schedule (Appendix B). As a result of the late deliveries, Air Force costs on the lot 4 missile contract increased by about $8 million because of additional inflation costs (Appendix C).

Deviations and Waivers

The program office approved 199 of 202 major deviations and waivers to missile technical specifications without obtaining consideration from Hughes. On the remaining three deviations and waivers, the program office obtained consideration totaling $32,770. To determine the level of program office reviews performed and consideration obtained, we judgmentally selected 13 major deviations and waivers for review. Based on our review of contract documentation and discussions with contracting personnel, we determined that the program office did not require consideration if technical reviews concluded that there was no degradation in performance or affect on form, fit, or function.

Hughes' consideration. Our review of the 13 deviations and waivers showed that Hughes routinely stated that missile deliveries would slip from 2 to 12 months if the deviation or waiver was not approved. Program office documentation did not show that Hughes' statement was examined for validity. Hughes' statement created pressure on the program office to approve the deviations and waivers because of the possibility for further schedule slippages. In that regard, the Navy expressed concern with the program office relaxing technical standards in exchange for Hughes satisfying delivery schedule requirements.

Cost. The program office did not evaluate the cost impact of the 13 deviations and waivers or provide the rationale for no cost approvals on DoD Form 1694, "Request for Deviation/Waiver,"

as required by Military Standard 480B. We did observe that the program office obtained cost impact information from the DoD contract administration representative at Hughes in two cases. However, the program office did not use the information. Military Standard 480B requires that the program office analyze the total cost of the deviation or waiver and identify the total cost on DoD Form 1694. In the cost analysis, the program office is to include contractor and Air Force costs, inflation, and their effects on contract costs. Program office documentation did not explain why the recommended costs were not used when the no-cost deviations were approved.

For example, Hughes' deviation numbers A8CD019, A8CD020, and A8CD021 concerned broken glass components on electronic parts of the missile. In each case, a Hughes subcontractor damaged the glass components during manufacture. As consideration, Hughes proposed additional testing on the glass components to ensure that the damaged components would function as required. Hughes also stated that a 2-month delay in missile deliveries would be experienced if the deviations were not approved. The program office approved the deviations and accepted Hughes' proposed consideration. We believe the additional testing does not constitute consideration because, under a firm-fixed-price contract, Hughes was required to provide components that met specific requirements.

Conclusion

The program office was not complying with FAR requirements to obtain consideration in return for approving contract schedule extensions and granting deviations and waivers to technical specifications. In this respect, the program office needs to analyze and document the reasons for Hughes' schedule extensions and obtain equitable consideration in return. Also, the program office needs to obtain an equitable price reduction or other consideration in return for accepting nonconforming products.

RECOMMENDATIONS FOR CORRECTIVE ACTION

We recommend that the Program Director for the Advanced Medium Range Air-to-Air Missile program:

1. Analyze and document the reasons for late missile deliveries on production lots 1 through 3, determine the cost effects on subsequent missile production contracts, and negotiate appropriate consideration with Hughes Aircraft Company.

2. Implement the guidance in the Armed Services Pricing Manual to determine and document events affecting delivery schedule slippages so that consideration can be fairly and objectively negotiated.

3. Implement the requirement in Air Force Regulation 14-1, "Configuration Management," by obtaining consideration in return for each approved deviation or waiver and by identifying the rationale for the consideration on Department of Defense Form 1694, as required by Military Standard 480B, "Configuration Control-Engineering Changes, Deviations and Waivers."

MANAGEMENT COMMENTS

The Deputy Assistant Secretary of the Air Force (Acquisition) nonconcurred with Recommendation C.1. stating that the schedule slips were primarily driven by hardware changes resulting from missile performance problems. He stated that the program office subsequently determined that the hardware problems were caused by the actual F-15 flight environment exceeding environmental requirements established in the AMRAAM contract. Accordingly, the contract was modified. He further stated that the lot 3 delivery schedule was rebaselined to prevent a production gap resulting from the DAB delaying production approval for lot 4.

The Deputy Assistant Secretary concurred with Recommendation C.2. stating that it was the program office's standard procedure to document events affecting delivery schedule slippages.

The Deputy Assistant Secretary concurred with the intent of Recommendation C.3. stating that the program office had been fulfilling the requirements in FAR, subpart 46.407, on nonconforming supplies or services. He stated that the program office did evaluate deviations and waivers to determine and document a degradation in system performance to obtain an equitable price reduction or other consideration when nonconforming supplies were accepted. In this respect, he stated that the program office determined that most deviations and waivers in the lot 1 contract had no cost impact or degradation

in system performance. He stated that the program office did identify consideration due to the Government where degradation in system performance was determined and provided an example where the program office's technical evaluation recommended $368,000 as consideration for acceptance of a nonconforming RF (radio frequency) Processor External Source. In addition, he stated that the program office did evaluate the three deviation examples cited in the draft report and determined that there was no performance degradation or cost impact. He stated that in one case the contractor proposed additional testing to ensure that the component's form, fit, and function were not impaired. He stated that the program office concluded that it was in the Government's best interest to accept the deviation with additional testing conducted by the contractor as consideration since the component's form, fit, and function were not impaired.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

Although the management comments to Recommendation C.1. indicated that the program office determined the causes for delivery schedule delays, our review found that the program office's contract records did not contain documentation of the factors causing the delivery schedule delays. As stated in the report, the contract modifications extending the missile delivery schedules for production lots 1 through 3 included a provision for later price adjustments. As of March 1991, the program office had not issued contract modifications identifying the consideration obtained in return for extending the delivery schedules. In addition, the DAB should not be blamed for the program office having to extend the lot 3 delivery schedule. Justifiably, the DAB withheld production approval for lot 4 until satisfactory operational test results were available to justify further missile production. In regards to problems with the F-15 flight environment, we were aware of the problems that were identified during operational flights of the F-15. However, before the identification of this problem, both contractors were experiencing production quality problems.

In response to the questions related to the AMRAAM Nunn-McCurdy Amendment breach, the program office stated missile failure analysis identified that deficient manufacturing processes and lack of quality control contributed to missile problems. As a result, the Air Force suspended acceptance of operational missiles until the contractors could prove they were producing quality, reliable missiles. Therefore, delays in missile deliveries were caused by both contractor quality problems and a more severe operating environment on the F-15 aircraft. Since Hughes was the design contractor for the AMRAAM, the Air Force needs to determine what portion of the late missile deliveries

were attributed to contractor manufacturing process problems and problems caused by the F-15 environment. Therefore, we request that the Air Force reconsider its position in response to this final report. In addition, we request that the Air Force provide us copies of any contract modifications that document the factors causing the delivery schedule delays and the consideration obtained by the program office in return for extending the delivery schedules on missile production lots 1 through 3.

Although the Deputy Assistant Secretary concurred with Recommendations C.2. and C.3., his comments were nonresponsive. Although the program office may have established a standard procedure for documenting events affecting delivery schedule slippages, the program office had not implemented the standard procedure as discussed in the report. Therefore, we request that the Deputy Assistant Secretary reconsider his position in responding to this final report. Also, we disagree with management's contention that the program office was fulfilling requirements in FAR, subpart 46.407, for obtaining consideration on deviations and waivers. We acknowledged in the finding that the program office was performing technical evaluations of deviations and waivers to determine whether there was degradation in performance or an affect on form, fit, or function. However, consideration was received for only 3 of 202 major deviations and waivers. In respect to the RF Processor External Source example, the technical evaluation did recommend $368,000 as consideration for accepting nonconforming supplies. However, the program office approved this waiver at no cost to Hughes. In reference to the deviation example in the report, Hughes was required by contract to provide conforming supplies. Because Hughes' subcontractor damaged the parts, Hughes was required by contract to perform the additional acceptance tests. Accordingly, we did not consider the additional Hughes testing as consideration for accepting nonconforming supplies. Therefore, we request that the Deputy Assistant Secretary reconsider his position in responding to this final report.

STATUS OF RECOMMENDATIONS

Number	Addressee	Response Should Cover: Concur/ Nonconcur	Proposed Action	Completion Date	Related Issue*
1.	Deputy Assistant Secretary of the Air Force (Acquisition)	X	X	X	IC
2.	Deputy Assistant Secretary of the Air Force (Acquisition)	X	X	X	
3.	Deputy Assistant Secretary of the Air Force (Acquisition)	X	X	X	

* IC = material internal control weakness

D. Missile Interchangeability

The AMRAAM program office's strategy to verify interchangeability between Hughes' and Raytheon's missile components and provide missile maintenance was not cost-effective. In planning for demonstrating missile interchangeability and initial AMRAAM maintenance, the program office did not consider using one contractor to perform interim contractor support. As a result, the Air Force will unnecessarily spend $4.4 million to perform an Interchangeability Configuration Audit Demonstration (ICAD) and will unnecessarily incur additional contractor maintenance support costs.

DISCUSSION OF DETAILS

Background

Hughes and Raytheon are to produce missiles that have interchangeable components. The Air Force Program Management Directive for the AMRAAM requires that missiles from the two contractors be common to the lowest cost-effective, depot-replaceable level. Accordingly, Hughes' and Raytheon's production contracts require that they produce missiles that are identical in form, fit, and function. In addition, the contract terms require that the two contractors coordinate their efforts for development of common special test equipment for missile production and repair support.

Interchangeability Configuration Audit Demonstration. In response to the Program Management Directive, the program office developed an ICAD to verify hardware interchangeability between the two contractors on lot 1 production missiles. The ICAD is to be performed in three phases. Phases I and II are structured to demonstrate the interchangeability of each contractor's hardware to the component/subassembly and chassis/assembly levels, respectively. Phase III is structured to demonstrate the capability to substitute sections between contractor's missiles. Missile components that both prime contractors were buying from the same vendor were excluded from the ICAD.

Performance of the Interchangeability Configuration Audit Demonstration. The ICAD was postponed in October 1989 because of missile design problems and the need to use the funds to resolve the design problems. The postponement was also justified on the basis that the two prime contractors had previously demonstrated the successful interchange of a number of missile hardware components. As of May 1991, the program office planned to perform the ICAD in the lot 6 production contract at a cost of approximately $4.4 million.

Integrated Logistics Support Plan. The program office's Integrated Logistics Support Plan states that each contractor will be required to repair its own missiles for 5 years. At the end of 5 years, the Government assumes responsibility for missile repairs in a DoD approved maintenance facility. Interim contractor support is to begin in FY 1991 on lot 3 production contracts and end in FY 1995 on lot 7 production contracts. Using program office cost data, we estimated that interim contractor support will cost about $7 million for FYs 1994 and 1995, excluding spare parts. The Integrated Logistics Support Plan did not address the feasibility of competing interim contractor support between the prime contractors and thereby demonstrating the interchangeability of Hughes' and Raytheon's missile components.

Interim contractor support. Interchangeability between Hughes and Raytheon missiles and components can be demonstrated during interim contractor support. The AMRAAM requires limited field level maintenance. On the aircraft, the crew performs missile built-in-tests to determine whether all components are functioning properly. When component failures are detected and verified, missiles are returned to the depot for interim contractor support. During interim contractor support, the contractors will be required to repair or substitute missile components, subassemblies, chassis, and missile sections.

The AMRAAM program office could contract with either Hughes or Raytheon to repair all missiles returned for depot maintenance during interim contractor support. Under such a contract, the contractor would demonstrate whether its hardware was interchangeable with the other contractor's hardware at the component/subassembly and chassis/assembly levels and the capability to substitute its missile sections with the other contractor's missiles. In so doing, the interim support contractor would demonstrate whether the contractors' components are the same in form, fit, and function.

Since Hughes and Raytheon have been awarded contracts for interim contractor support through FY 1993, the program office could initially compete interim contractor support between Hughes and Raytheon for FY 1994.

Demonstrated Interchangeability

Hughes and Raytheon have successfully demonstrated limited interchangeability for missile components, subassemblies, chassis, missile sections, and special test equipment. Program office documentation indicated that no interchangeability

problems were experienced with the hardware and special test equipment interchanged. Through May 1991, the two prime contractors had successfully interchanged the following equipment.

o Raytheon special test equipment used for testing missile chassis, was built from Hughes' drawings using Hughes' hardware for validating commonality of special test equipment.

o Initial Raytheon chassis hardware was tested on Hughes special test equipment.

o Four Raytheon guidance sections were installed in Hughes' missiles during the reliability test program.

o Three Raytheon and one Hughes Intermediate Frequency Receiver and Range Correlator chassis were installed in a Raytheon missile guidance section and tested on Hughes' special test equipment.

o Raytheon ceramicard assemblies were tested on Hughes' special test equipment.

o Four Hughes missiles were launched with Raytheon wiring harnesses and flight plugs.

o Raytheon's Input and Output chassis, Data Processor chassis, and Filter Processor chassis were interchanged in a Hughes missile.

Conclusion

In our opinion, the above results demonstrate that the two prime contractors are complying with contractual requirements to ensure that their missiles and components are the same in form, fit, and function and to coordinate development of their special test equipment. Accordingly, we believe that it is feasible and low risk to compete interim contractor support between the prime contractors. By competing interim contractor support, the program office could demonstrate interchangeability of missile components, subassemblies, chassis, missile sections, and special test equipment. As a result of this action, the Air Force could cancel the ICAD, costing about $4.4 million, and reduce interim contractor support costs for FYs 1994 and 1995 through competition.

RECOMMENDATIONS FOR CORRECTIVE ACTION

We recommend that the Program Director for the Advanced Medium Range Air-to-Air Missile program:

1. Compete FY 1994 and FY 1995 interim contractor support requirements between Hughes and Raytheon.

2. Cancel the planned Interchangeability Configuration Audit Demonstration.

MANAGEMENT COMMENTS

The Deputy Assistant Secretary of the Air Force (Acquisition) nonconcurred with Recommendation D.1. stating that competing interim contractor support was not low risk. He further stated that in May 1991, the DAB directed the conduct of a study addressing the need for an organic (in-house within DoD) depot capability versus contractor support for the life of the system. Accordingly, the Deputy Assistant Secretary stated that competing interim contractor support at this time could reduce the Air Force's flexibility to respond to subsequent DAB direction. He added that the program office would address competing interim contractor support after the study is evaluated.

The Deputy Assistant Secretary concurred with the intent of Recommendation D.2. stating that no action was required because the ICAD had not yet been contracted for. He further stated that the AMRAAM program office will determine whether an ICAD is needed at a later date.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

The Deputy Assistant Secretary's comments to Recommendation D.1. concerning the risk of competing interim contractor support were not consistent with the Air Force's overall position at the May 1991 DAB meeting. In May 1991, the Air Force requested the DAB for authority to proceed with full-rate production of the AMRAAM. DoD Directive 5000.2, "Defense Acquisition Management Policies and Procedures," February 23, 1991, states that decision criteria for full-rate production include reasonable assurance that the design is stable, operationally acceptable, and logistically supportable. We therefore believe that competing interim contractor support should be low risk since the two prime contractors have demonstrated that they are complying with contractual requirements to ensure that their missiles and components are the same in form, fit, and function, as discussed in the finding.

In addition, the Air Force study addressing the need for an organic depot capability should not be a factor in the decision to compete interim contractor support because contractor support will be required through FY 1995, regardless of the study results. OSD has projected that a full organic depot capability will not be in place until FY 1996 at the earliest. We request that the Deputy Assistant Secretary reconsider his position and provide additional comments to this recommendation in response to the final report.

Although the Deputy Assistant Secretary concurred with Recommendation D.2., his comments were nonresponsive. We agree that the ICAD had not yet been contracted for; however, documentation obtained during the audit identified an internal plan to conduct the ICAD in production lot 6. The Deputy Assistant Secretary's comments indicated that the need for an ICAD is not clear and may not be necessary; therefore, the Air Force must believe the contractors' missiles are interchangeable in form, fit, and function, as required in the Air Force Program Management Directive. Thus, we still believe the Air Force can obtain cost savings and demonstrate interchangeability by competing the interim contractor support. We therefore request that the Deputy Assistant reconsider his position and provide additional comments to this recommendation in response to the final report.

STATUS OF RECOMMENDATIONS

		Response Should Cover:		
Number	Addressee	Concur/ Nonconcur	Proposed Action	Completion Date
D.1.	Deputy Assistant Secretary of the Air Force (Acquisition)	X	X	X
D.2.	Deputy Assistant Secretary of the Air Force (Acquisition)	X	X	X

E. Contractor Support and Program Office Staffing

The Air Force did not properly identify and report contracted advisory and assistance services (CAAS) to Congress, and the AMRAAM program office was using the contracted services to satisfy 49 percent of program office staffing requirements. The contracting officer did not report the CAAS effort because he believed that the engineering services did not meet the CAAS definition. Also, contracted services were used because program office staffing levels were insufficient to meet mission requirements. As a result, contractor support services were not subject to congressional restrictions, and extended reliance on contractors may not be appropriate or cost-effective.

DISCUSSION OF DETAILS

Background

Policy. Congress has been interested in CAAS for many years because of CAAS' vulnerability to abuse and conflict of interest. Office of Management and Budget (OMB) Circular A-120, "Guidelines for the Use of Advisory and Assistance Services," January 4, 1988, provides general policy for determining and controlling the appropriate use of CAAS. DoD Directive 4205.2, "DoD Contracted Advisory and Assistance Services," January 27, 1986, establishes policy, assigns responsibilities, and prescribes procedures for planning, managing, evaluating, and reporting CAAS. The Directive states that CAAS policy will be to obtain contractor services on an intermittent or temporary basis, and repeated or extended CAAS arrangements shall occur only under extraordinary circumstances. The Directive does not define intermittent or temporary. However, the OMB Circular states that CAAS contracts may not continue longer than 5 years without review for compliance with policy. FAR, subpart 37.1, "Service Contracts," states that no contract may be awarded for the performance of an inherently governmental function. However, what constitutes an inherently governmental function is broadly defined, leaving the definition to varying interpretations.

Definition of contracted services. FAR, subpart 37.2, "Advisory and Assistance Services," and DoD Directive 4205.2 define CAAS as including management support services and engineering and technical services. Contractor management support services include acquisition management, project monitoring and reporting, data collection, logistics, budgeting, and accounting. Contractor engineering and technical services ensure more efficient and effective operation of weapon systems, equipment, components, and software. However, the CAAS definition does not include engineering and technical services

that provide feedback concerning production and continuing engineering programs.

AMRAAM engineering support services. The Munitions Systems Division at Eglin Air Force Base uses Technical and Engineering Acquisition Support (TEAS) contracts to provide engineering research, development, test, and acquisition support to program managers. The TEAS contract is a 5-year, cost-plus-award-fee contract for $170.6 million that was awarded in January 1991 and is a follow-on to a previous 5-year contract awarded for $67.3 million. The TEAS contract provides for continued engineering support for the AMRAAM program and other weapon programs managed at Eglin Air Force Base.

Program office staffing policy. OMB provides general guidance on program office staffing in Office of Federal Procurement Policy Pamphlet No. 1, "Major System Acquisitions," August 1976. The Pamphlet states that a weapon system program manager should recruit a staff with the requisite skills and experience to manage the assigned system, and the management level should be consistent with the importance and scope of the program. On March 25, 1991, OMB issued a clarifying letter stating that DoD should take the necessary steps to ensure that adequate staffing is available to perform inherently governmental functions.

Program Office Use of Contracted Services

Our examination of the AMRAAM task orders on the TEAS contract for FYs 1990 and 1991 showed that the contractor was performing CAAS services for the AMRAAM program office, that is, the contractor was assisting the program office in monitoring the performance of the two AMRAAM prime contractors and their subcontractors. In that capacity, the TEAS contractor was required to:

- o perform technical reviews and evaluations of a modernization program including representing the program office at conferences and workshops;
- o evaluate subcontractor quality control;
- o provide assistance in identifying and evaluating preplanned product improvement proposals;
- o participate in production readiness reviews;
- o evaluate labor efficiency reports for data integrity;

o provide technical support during source selection;

o assist in identifying causes of production slippages;

o participate in in-process and design reviews, audits, and program team meetings;

o review, and recommend changes to, program management plans, acquisition plans, test and evaluation plans, and program baselines; and

o review contract statements of work, requests for proposals, and contract requirements to ensure that they reflect current technical and program acquisition strategy.

The contracting officer did not classify this effort as CAAS because engineering services that provide feedback concerning production and continued engineering programs are excluded in the FAR and the DoD Directive CAAS definitions. Although the TEAS contracting effort was engineering in nature, we believe that the effort should be reported as CAAS because it directly supported the program office in the areas of acquisition management and project monitoring.

Program Office Staffing

Contractor support services were extensively and continuously used to augment AMRAAM program office staffing. As of October 25, 1990, the program office's workforce estimate showed that there were 76 military personnel (64 officers and 12 enlisted) and 93 civilians assigned at the program office. The military officers and senior civilian personnel (GS-11 and above) were assigned responsibility for managing directorates or divisions and providing functional guidance and direction. In addition, program office staffing was supplemented by 163 contractor positions, resulting in a total of 332 personnel. Accordingly, about 49 percent (163 divided by 332) of the program office's workforce was contractor personnel. The contractor support was performed by nine contractors of which four had personnel permanently collocated in the program office to perform assigned tasks. Appendix D identifies the civilian, military, and contractor personnel assigned to each functional element in the AMRAAM program office.

In the TEAS contract procurement justification, the AMRAAM program office stated that contractor support services were required to "augment the shortfalls existing in organic engineering resources and provide a long-term stable source of engineering expertise," and ". . . the TEAS contractor will also

provide management and administrative support staff as necessary to provide system acquisition support."

Program office reliance on contractor support was also caused by a 68-percent turnover in military personnel and a 36-percent turnover in senior civilian personnel from January 1989 to March 1991. Consequently, much of the program office's corporate knowledge resided with AMRAAM support contractor personnel and not with the military and civilian staff.

Based on previous audit reports and studies, it may not be cost-effective to continue to rely on contractor support. Specifically, Office of the Inspector General Report No. 91-041, "Contracted Advisory and Assistance Services Contracts," February 1, 1991, showed that potential cost savings of between 37 and 51 percent were possible if long-term efforts were performed in-house. In addition, Office of the Inspector General Report No. 91-115, "Consulting Services Contracts for Operational Test and Evaluation," August 22, 1991, showed that test agencies were spending between 21 and 37 percent more on repeated and extended service contracts for contractor personnel as compared to the costs for equivalent civilian Government employees. The AMRAAM program office had not studied the cost-effectiveness of continued use of contractor personnel support versus requesting an increase in its Government workforce authorizations.

Conclusion

The CAAS at the AMRAAM program office should be reported and managed in accordance with OMB and DoD policy. Also, the program office's repeated and extended use of support contractors to assist in its acquisition management role was inappropriate because of the loss of accountability for management decisions and the placement of program corporate knowledge with support contractors.

RECOMMENDATIONS FOR CORRECTIVE ACTION

We recommend that the Commander, Aeronautical Systems Division:

1. Report the Advanced Medium Range Air-to-Air Missile program's technical and engineering acquisition support effort as contracted advisory and assistance services, as required by Office of Management and Budget Circular A-120, "Guidelines for the Use of Advisory and Assistance Services," January 4, 1988.

2. Evaluate the Advance Medium Range Air-to-Air Missile program office's staffing to determine whether reliance upon support contractors is cost-effective and appropriate.

MANAGEMENT COMMENTS

The Deputy Assistant Secretary of the Air Force (Acquisition) nonconcurred with Recommendation E.1. stating that the contracting officer determined that the TEAS contract engineering and technical services were excluded from the definition of CAAS as identified in FAR, subpart 37.2. The Deputy Assistant Secretary stated that the TEAS contractors provided the AMRAAM program office technical assessments and recommendations rather than CAAS management services as defined in FAR, subpart 37.2.

The Deputy Assistant Secretary also nonconcurred with Recommendation E.2. stating that the AMRAAM program office was the subject of a manpower review by the Commander of the Aeronautical Systems Division in 1990. The review was performed in response to Air Force manning reductions brought on by the Defense Management Review and the President's FY 1992 Budget drawdown. Based on the review, the AMRAAM Program Director and the Commander of the Aeronautical Systems Division agreed that the manning level and the mix of DoD and contractor personnel was appropriate with the exception of several positions in the contracting office. Further, the Deputy Assistant Secretary stated that the mix of DoD and contractor personnel was considered cost-effective in view of the current turbulence (reduction) in the Government manning situation.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

In response to Recommendation E.1., management incorrectly maintained that FAR, subpart 37.2, excluded engineering and technical services provided in the TEAS contracts from the definition of CAAS. Because of misinterpretations of the CAAS definition, the Under Secretary of Defense for Acquisition agreed to clarify the definition of CAAS in DoD Directive 4205.2, "DoD Contracted Advisory and Assistance Services," January 1986. The clarification in the CAAS definition is in response to our audit Report No. 91-041, "Contracted Advisory and Assistance Services Contracts," February 1, 1991. The revised draft Directive will state that contract services that provide engineering or technical support, assistance, or advice for the efficient and effective management of a system are considered CAAS, Management, and Professional Support services. The draft Directive states that these services are normally closely related to the basic responsibilities of the user. The Directive further states that engineering or technical efforts that support or contribute to program management, logistics management, project monitoring and reporting, and data collection is CAAS. The Under Secretary has coordinated the revised draft Directive with the Military Departments and had submitted the revised Directive to the Deputy

Secretary of Defense for approval at the time of this final report. Changes to the Defense Federal Acquisition Regulation Supplement will follow.

As clarified in the revised draft Directive, the engineering and technical support efforts on the TEAS contracts are now clearly considered to be CAAS because the efforts support the AMRAAM program management, project monitoring, and reporting. We therefore request that the Deputy Assistant Secretary of the Air Force (Acquisition) reconsider his response to Recommendation E.1. when responding to the final report.

In response to Recommendation E.2., the Deputy Assistant Secretary stated that the Commander of the Aeronautical Systems Division evaluated AMRAAM program office staffing in 1990 but did not state that a cost analysis was performed to support the conclusion that reliance upon support contractors was cost-effective. The revised draft DoD Directive 4205.2 will require a procurement justification certification by the activity that records that such services have been reviewed for cost-effectiveness and efficiency. The revised Directive continues to state that if the effort is long-term and could be performed more cost-effectively in-house, a statement on actions being taken to hire additional resources is required. We believe that the recommendation is still valid; however, the revised Directive will cause the AMRAAM program office to take actions that satisfy the intent of Recommendation E.2. Therefore, we are not requesting additional comments to Recommendation E.2. in the final report.

STATUS OF RECOMMENDATIONS

		Response Should Cover:		
Number	Addressee	Concur/ Nonconcur	Proposed Action	Completion Date
E.1.	Deputy Assistant Secretary of the Air Force (Acquisition)	X	X	X

PART III - ADDITIONAL INFORMATION

Appendix A - Prior Audits and Other Reviews
Appendix B - Comparison of Hughes' AMRAAM Deliveries and Original Contract Delivery Requirements
Appendix C - Estimate of Additional Inflation Cost as a Result of Late Missile Deliveries
Appendix D - AMRAAM Staffing by Directorate
Appendix E - Summary of Potential Benefits Resulting from Audit
Appendix F - Activities Visited or Contacted
Appendix G - Report Distribution

APPENDIX A: PRIOR AUDITS AND OTHER REVIEWS

General Accounting Office

Report No. NSIAD 91-209 (OSD Case No. 8683), "Missile Procurement: AMRAAM's Reliability is Improving, but Production Challenges Remain," June 1991. The report stated that operational tests have demonstrated significantly improved missile reliability since May 1990. Also, both contractors were at least 6 months behind in deliveries. The report recommended that the Department of Defense monitor the contractors' deliveries and, if deliveries fall further behind, reduce missile quantities procured under subsequent contracts. The Department of Defense concurred with the recommendation and stated that reviews of the AMRAAM delivery schedule are done each year during budget reviews.

Report No. NSIAD 90-146 (OSD Case No. 8288), "Missile Procurement: Further Production of AMRAAM Should Not Be Approved Until Questions Are Resolved," May 1990. This report addressed the status of AMRAAM at the scheduled full-rate production milestone focusing on the missile's demonstrated operational performance, the contractors' readiness to produce quality missiles at the required rates, and the latest program cost estimates. The report concluded that significant questions about AMRAAM's performance, reliability, producibility, and affordability remain unresolved. The report recommended that AMRAAM not be allowed additional production funding until the problems were resolved. OSD partially concurred, stating that it would keep the AMRAAM program in low-rate initial production until the AMRAAM's performance improved.

Report No. NSIAD 89-201 (OSD Case No. 8060), "AMRAAM Not Ready for Full Rate Production," September 7, 1989. The audit objective was to determine whether the missile's design was complete and stable, if operationally realistic tests demonstrated the missile's required performance, and if the contractors demonstrated ability to produce quality missiles at the required production rates. The review found that the Air Force had not demonstrated that the missile can meet some critical performance requirements, and the missile's operational reliability was unacceptable. It was further noted that the contractors might not be able to meet the higher production rates on schedule. This report recommended that the AMRAAM not enter full-rate production because it did not meet these objectives. OSD concurred.

Inspector General, DoD

Report No. 91-061, "Quick-Reaction Report on Component Breakout of the Advance Medium Range Air-to-Air Missile Program," March 14, 1991. This report was issued to alert management of the need to discuss component breakout at the DAB meeting held on May 23, 1991. The auditors estimated that savings of $312 million could be achieved during the remaining missile buy without unduly increasing program risk through component breakout. The program office agreed to conduct an in-depth component breakout study. The study concluded that component breakout is not feasible due to an unstable component design; or that component quality, reliability, performance, and timely delivery would be jeopardized.

Air Force Audit Agency

Project 8036323, "Followup Audit - Acquisition Management of the Advanced Medium Range Air-to-Air Missile," December 30, 1988. This was a follow-up audit on a 1984 Air Force Audit Agency report that recommended that a study be conducted on component breakout. The report concluded that management action was responsive.

APPENDIX B: COMPARISON OF HUGHES' AMRAAM DELIVERIES AND ORIGINAL CONTRACT DELIVERY REQUIREMENTS FOR PRODUCTION LOTS 1 THROUGH 3

(As of May 31, 1991)

	1988				1989												1990
Production Lot 1 Schedule	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Original 1/	1	2	3	5	7	9	11	13	4	4	46						
Revised 2/3/	1	1	0	3	0	7	4	11	15	0	0	0	0	0	6	14	43
Actual 4/	1	2	0	5	2	6	5	4	8	0	5	7	1	1	25	9	24

	1989				1990												1991				
Production Lot 2 Schedule	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
Original	16	17	19	19	19	19	19	19	19	19	19	19									
Revised 5/								6	0	4	8	25	20	22	22	22	24	33	37		
Actual								6	0	4	8	21	3	9	24	15	31	33	34	21	14

	1990			1991												1992		
Production Lot 3 Schedule	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Original	12	45	45	47	55	55	55	55	55	55	55	55						
Revised 6/							39	45	45	45	45	45	45	45	45	45	45	45
Actual								16										

1/ Delivery schedule established at award of firm-fixed-price contract.
2/ Revised delivery schedule established in contract modification after contract award.
3/ The contract delivery schedule was modified on August 31, 1990, 7 months after the last missile delivery in January 1990.
4/ Actual month and year Hughes delivered missiles.
5/ The contract delivery schedule was modified on August 1, 1990, to agree with Hughes' actual delivery schedule through July 1990.
6/ The contract delivery schedule was modified on August 1, 1990.

APPENDIX C: ESTIMATE OF ADDITIONAL INFLATION COST AS A RESULT OF LATE MISSILE DELIVERIES

We estimated the impact of the additional inflation cost on the lot 4 production contract price based on Hughes' AMRAAM delivery performance on production lots 1 through 3.

Condition. Hughes did not meet original delivery schedule requirements on firm-fixed-price contracts for production lots 1 through 3. Hughes' last missile delivery was 6 months late on production lot 1 and 9 months late on production lot 2. On production lot 3, Hughes' first missile delivery was 7 months late. In addition, Hughes did not satisfy the monthly delivery requirement in the eighth month.

Based on Hughes' delivery record on production lots 1 and 2, and deliveries on production lot 3 through May 31, 1991, we estimate that Hughes will complete lot 3 deliveries, at a minimum, 9 months behind the original contract delivery schedule. In respect to production lot 4, the program office's cost estimate was based on costs in FY 1990 then-year dollars, rather than costs in FY 1991 then-year dollars, because the lot 4 contract was originally planned to be awarded in FY 1990.

Impact. We calculated the impact of the 9-month delay on the contract price negotiated with Hughes for lot 4 by applying the change between OSD inflation escalation factors used in FYs 1990 and 1991 to the program office's cost estimate of $289.75 million in then-year dollars.

- Annual percent change in OSD Escalation Factors:

$$\frac{1.383 \text{ (1991 factor) minus } 1.332 \text{ (1990 factor)}}{1.332 \text{ (1990 factor)}}$$

- The percent change in the OSD Escalation Factor attributable to the estimated 9-month missile delivery schedule delay on production lot 3:

$$\frac{9 \text{ months}}{12 \text{ months}}$$

- Additional inflation costs on production lot 4:

$289.75 million x 2.873 percent = $8.32 million

APPENDIX D: AMRAAM STAFFING BY DIRECTORATE

(As of February 23, 1991)

Directorate	Authorized Personnel			
	Civilians	Military	Contractor	Total
Deputy for AMRAAM	3	3	0	6
Acquisition	9	9	17	35
Advanced Projects	3	5	5	13
Configuration and Data Management	4	1	8	13
International	3	0	1	4
Test	1	7	0	8
Program Control	8	11	4	23
Logistics	9	10	6	25
Engineering	36	24	122	182
Contracts	17	4	0	21
Management Operations	0	2	0	2
Total	93	76	163	332

APPENDIX E: SUMMARY OF POTENTIAL BENEFITS RESULTING FROM AUDIT

Recommendation Reference	Description of Benefit	Amount and/or Type of Benefit
A.1.	Internal Controls. Ensures that Hughes only makes approved engineering changes to the missile rail launcher design.	Nonmonetary.
A.2.	Compliance with Regulations. Ensures that Hughes submitted all missile rail launcher engineering changes to the AMRAAM program office for review and approval in accordance with DoD direction.	Nonmonetary.
A.3.	Compliance with Regulations and Internal Controls. Ensures that the Air Force supporting command is provided engineering data needed to support the missile.	Nonmonetary.
B.1.	Compliance with Regulations. Ensures that the AMRAAM program office is provided information needed to adequately oversee Hughes' missile software development effort.	Nonmonetary.
B.2.	Compliance with Regulations. Ensures that all AMRAAM missile software programs are described in the Computer Resources Life Cycle Management Plan.	Nonmonetary.
B.3.	Program Results. Ensures that Hughes has met AMRAAM missile software requirements.	Nonmonetary.

APPENDIX E: SUMMARY OF POTENTIAL BENEFITS RESULTING FROM AUDIT (cont'd)

Recommendation Reference	Description of Benefit	Amount and/or Type of Benefit
C.1.	Internal Control. Through analysis, the AMRAAM program office can negotiate and obtain consideration from Hughes in exchange for approving delivery schedule extensions on AMRAAM production lots 1 through 3.	Undeterminable. Amount not quantifiable until the AMRAAM program office completes its analysis of the causes for the late missile deliveries.
C.2.	Compliance with Regulations. Ensures that the AMRAAM program office promptly determines and documents the reasons for missile delivery slippages in the future for use in negotiating and obtaining contractor consideration.	Nonmonetary.
C.3.	Compliance with Regulations. Implementation of Air Force direction will ensure that the AMRAAM program office obtains consideration in exchange for approving major deviations and waivers.	Nonmonetary.
D.1.	Economy and Efficiency and Program Results. By competing interim contractor support, the AMRAAM program office can demonstrate interchangeability between Hughes and Raytheon missiles and reduce missile support costs.	Nonmonetary.

APPENDIX E: SUMMARY OF POTENTIAL BENEFITS RESULTING FROM AUDIT (cont'd)

Recomendation Reference	Description of Benefit	Amount and/or Type of Benefit
D.2.	Economy and Efficiency. Cost avoidance benefits resulting from canceling the ICAD.	Funds put to better use. $4.4 million for FY 1992. One-time benefit for Air Force Missile Procurement 3020 Appropriation.
E.1.	Compliance with Regulations. Ensures that AMRAAM program office contracted services are identified and reported to OMB, as required by DoD direction.	Nonmonetary.
E.2.	Economy and Efficiency. Ensures the AMRAAM program office's use of contractor support services is cost-effective and appropriate.	Nonmonetary

APPENDIX F: ACTIVITIES VISITED OR CONTACTED

Office of the Secretary of Defense

Office of the Under Secretary of Defense for Acquisition, Deputy Director (Tactical Warfare Programs), Washington, DC
Office of the Assistant Secretary of Defense (Program Analysis and Evaluation), Washington, DC

Department of the Navy

Naval Air Systems Command, Arlington, VA
Pacific Missile Test Center, Point Mugu, CA

Department of the Air Force

Office of the Assistant Secretary of the Air Force (Financial Management and Comptroller), Washington, DC
AMRAAM Joint System Program Office, Aeronautical Systems Division, Eglin Air Force Base, FL
Electronic Systems Division, Hanscom Air Force Base, MA
Warner-Robins Air Logistics Center, Robins Air Force Base, GA

Other Defense Activities

Defense Contract Management Region-Boston, Boston, MA
Defense Contract Audit Agency, Lowell, MA
Defense Contract Audit Agency, Tucson, AZ
Defense Plant Representative Office, Tucson, AZ
Joint Depot Maintenance Analysis Group, Gentile Air Force Station, Dayton, OH

Contractors

Hughes Aircraft Company, Missile Systems Group, Canoga Park, CA
Hughes Aircraft Company, Missile Systems Group, Tucson, AZ
Raytheon Company, Burlington, MA
Raytheon Company, Missile Systems Division, Bedford, MA

APPENDIX G: REPORT DISTRIBUTION

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition
Assistant Secretary of Defense (Production and Logistics)
Assistant Secretary of Defense (Program Analysis and Evaluation)
Assistant Secretary of Defense (Public Affairs)
Comptroller of the Department of Defense

Department of the Navy

Secretary of the Navy
Assistant Secretary of the Navy (Financial Management)
Comptroller of the Navy
Commander, Naval Air Systems Command
Commander, Pacific Missile Test Center
Auditor General, Naval Audit Service

Department of the Air Force

Secretary of the Air Force
Assistant Secretary of the Air Force (Financial Management and Comptroller)
Commander, Air Force Systems Command
Commander, Aeronautical Systems Division
Program Director, Advanced Medium Range Air-to-Air Missile
Warner-Robins Air Logistics Center
Auditor General, Air Force Audit Agency

Defense Agencies

Director, Defense Logistics Agency
Director, Defense Logistics Studies Information Exchange
Director, Joint Depot Maintenance Analysis Group

Office of Management and Budget
U.S. General Accounting Office, NSIAD Technical Information Center

Congressional Committees:

Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
Ranking Minority Member, Senate Committee on Armed Services
House Committee on Appropriations
House Subcommittee on Defense, Committee on Appropriations
Ranking Minority Member, House Committee on Appropriations
House Committee on Armed Services
House Committee on Government Operations
House Subcommittee on Legislation and National Security, Committee on Government Operations

PART IV - MANAGEMENT COMMENTS AND AUDIT RESPONSE

Department of the Air Force Comments
Audit Response to Management Comments

Department of the Air Force Comments

DEPARTMENT OF THE AIR FORCE
WASHINGTON DC 20330-1000

OFFICE OF THE ASSISTANT SECRETARY

NOV 2 5 1991

MEMORANDUM FOR ASSISTANT INSPECTOR GENERAL FOR AUDITING
OFFICE OF THE INSPECTOR GENERAL
DEPARTMENT OF DEFENSE

SUBJECT: Report on the Audit of the Advanced Medium Range Air-to-Air Missile (Project No. 0AS-0072), Draft, September 16, 1991 - INFORMATION MEMORANDUM

This is in reply to your memorandum for the Assistant Secretary of the Air Force (Financial Management and Comptroller) requesting comments on the findings and recommendations made in subject report.

The draft report has been reviewed within the AMRAAM Joint System Program Office and coordinated comments to the text, findings and recommendations have been provided by the Program Director. These comments were also reviewed by the Air Force Program Executive Officer for Tactical Strike Programs and by the Commander, Aeronautical Systems Division.

The complete Air Force comments are attached. The SAF/AQ point of contact for this audit report is Capt Ken Merchant, 697-7715.

1 Attachment
Air Force Comments

DANIEL S. RAK
Deputy Assistant Secretary
(Acquisition)

Final Report Reference

Air Force Comments to the
Draft DoD IG Report on the Audit of the
Advanced Medium Range Air-to-Air Missile, September 16, 1991

1. The draft report has been reviewed and the Air Force does not agree with the statement that internal controls do not exist in some areas of the program office. Additionally, several incorrect statements are made throughout the report. Specific comments to each finding, erroneous statement, and recommendation as they relate to those internal controls follow.

1 2. Page 1, Part I - Introduction, Acquisition Strategy. Second sentence - change to read "The Air Force... strategy has provided... and therefore will reduce...".

Page 2, Part I, Procurement History.

1 First sentence: change to read "The Air Force and Navy currently plan...".

Revised Second sentence: change to read "Since... in 1986, five

1 low-rate...(production Lots 1 through 5).

1 Fourth Sentence is inaccurate and should be deleted. Cost

Revised was not planned to be nor was it the controlling factor for the Lot 5 award split.

1 Fifth sentence: change to read "As of June 1991,... for 3,219 missiles."

2 The Congressional cost ceiling was adjusted for Congressional actions which impacted the AMRAAM cost, but was not adjusted for internal DOD actions. DOD budget adjustments further stretched the program to a total of 13 lots vs the originally planned 10 lots and contributed to the cost growth. The Defense Acquisition Board also directed the use of a lower competition percentage for costing the AMRAAM procurement. The Air Force believes the 24,300 missile, $9.4B program could have been procured at a lower cost. Page 3, first sentence should be changed to read "DOD projected total AMRAAM costs...".

3 Page 4, Part I, Objectives, Dual Source Planning. Second sentence: change to read "Although... may not fully accrue...".

Page 6, Part I, Internal Controls.

3 Fourth sentence is inaccurate and should be deleted as JSPO approval was not required for all rail launcher changes as stated in Part II (see comments to Recommendation A.1).

3 Fifth through eighth sentence should also be deleted as the JSPO did obtain consideration for schedule slips when liability

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for those slips was determined (see comments to Recommendation C.1).

4 Page 8, Part I, Component Breakout. First full sentence: change to read "The report identified... manufacturing processes which in the opinion of the audit team were...".

Deleted Page 8, Part I, Baseline Reporting. The discrepancy concerning baseline reporting is in error. The directives governing Acquisition Program Baselines (APB) and Deviation Reports in 1990 were:

- DODI 7220.31 Unit Cost Reports, 8 Jul 87

- USD(A) Memorandum "Baseline Policy and Selected Acquisition Report (SAR) Submission, 30 Oct 89

- DODI 7220.31 Unit Cost Reports (Draft) attachment to OUSD(P&I) 18 Dec 89 memorandum "Logistics Changes to Acquisition Reporting".

- SAF/AQ Acquisition Policy Memorandum 90M-008m 14 Jul 90, "Policy Statement on Acquisition Program Baselines" and Addendum 1, 12 Nov 90

- DODI 5000.2 and DOD 5000.2M (Draft) implemented by Addendum 1 to SAF/AQ Policy Memorandum 90M-008, 12 Nov 90

The DoD IG incorrectly stated the JSPO did not promptly issue a program deviation report for the FY92 President's Budget decision to reduce the program by 8,709 missiles. The AMRAAM JSPO was directed to plan for a reduced total quantity buy of 15,500 (12,000 AF and 3,500 Navy) missiles in a 23 Feb 90 Program Management Directive. The JSPO was also directed in a 6 Mar 90 Acquisition Decision Memorandum (ADM) to provide an updated APB reflecting resolved missile quantities and acquisition strategy by 2 Apr 90. This APB update was provided on 6 Apr, a few days late due to the short suspense and coordination process. A Program Deviation Report did not accompany this updated APB because the directives which were current at that time did not require it. DODI 7220.31 Unit Cost Report (8 Jul 91) Enclosure 2 "Definitions" states that the current estimate will reflect "the latest approved program reported in the SAR, notwithstanding any changes in the program that may be under consideration in PPBS". The approved program definition further states that "changes being considered and reflected in Planning, Programming, and Budgeting System (PPBS) memorandum... may not be updated until approved and included in the President's Budget". The PMD planning quantities were not an approved program and would not be until the FY92 President's budget was finalized. The other items contained in the APB update had been reported in a Nov 89 Deviation Report or directed in the 6 Apr 90 ADM. The 15,500 total missile quantity change was reflected as an alternative program in the 6 Apr 90 APB clearly identifying it as an unapproved

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program. The new DOD 5000.2 and DOD 5000.2M require Deviation Reports to accompany the POM and BES when these positions would create a breach if approved. The POM and BES were submitted later in the year prior to the 12 Nov 90 SAF/AQ Policy Memorandum implementing the draft DODI 5000.2 and DOD 5000.2M. The JSPO submitted two additional APB updates in 1990 and all met the policy direction current at the time of submittal.

4 Page 9, Part I, Cost Estimating. The AMRAAM JSPO cost estimate included all costs relevant to the program. The ICA, conducted to support the DAB IIIB, included costs for the efforts which are not part of the AMRAAM life-cycle cost. The ICA team included aircraft modification costs which are totally independent of the AMRAAM program in that the modification would be accomplished even if the AMRAAM program did not exist. The ICA team also included Military Construction Program funds for undocumented and unsubstantiated requirements to provide storage capabilities at any base where aircraft which might be able to carry AMRAAMs were stationed. This included where storage facilities already existed and numerous locations where there is no intent to store AMRAAMs. The AF and OSD Cost Analysis Independent Groups concurred with the JSPO position.

7 and 8 Page 11 and 13, Part II, A Missile Rail Launcher and Configuration Control. The statement that "the AMRAAM program office had not established effective configuration control over the missile rail launcher design" is incorrect and reflects a misunderstanding of the configuration baseline management concept IAW AF Regulation 14-1, AFSC Pamphlet 800-7, MIL-STD-480B and MIL-STD-483 (USAF). AFR 14-1, paragraph 2-2 states that "Although there is a natural order of CM (configuration management) events and actions during the life cycle of a CI (configuration item), ...special program requirements may necessitate certain variations". Also MIL-STD-480B, paragraph 1.4 states that, "The application of this standard may be tailored to avoid premature formal Government control". Although the JSPO had established all three configuration baselines (functional, allocated and product) for the Lot I and Lot II launcher, the JSPO choose to allow the contractor to process Class II drawing changes, without requiring Government Plant Representative classification concurrence, at the beginning of the Lot III contract for those unique Lot III items that had to be redesigned to meet the allocated baseline (the allocated baseline takes precedence over the product baseline). For those areas/parts that the contractor was to redesign, it was the JSPO's intent to allow Hughes the latitude to redesign the hardware piece parts without Government approval. The JSPO gave Hughes the detail design freedom for the new unique Lot III parts to do what was necessary to meet the allocated baseline (Part I/ Development Specification) requirements (similar to FSD). To do otherwise would have added excessive cost increases and schedule delays. Record ECPs have been submitted to document directed design changes. The Lot III contract was structured to support the above approach by requiring the contractor to requalify the

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Lot III redesign, conduct a Functional Configuration Audit (FCA) and a Physical Configuration Audit (PCA). The JSPO intent was to re-establish the drawing part of the product baseline at the Lot III PCA. This has been accomplished. All baselines are under formal configuration control. While the methodology chosen could be debated, configuration control was never lost and the regulations were not violated.

8 Page 14. Baseline Documentation. Nonconcur with the inference that the launcher baseline design (it is assumed that the report means "product" baseline) can not be established before a completely acceptable Level 3 Technical Data Package is provided by the contractor. A final Level 3 In-process review can be accomplished at the PCA, if desired. Obviously if problems are found that require fixing, it will be subsequent to the PCA. Such problems as missing drawings and drawings that did not identify the next higher assembly (NHA), did not present any obstacle to reprocurement. The "missing" drawings were in existence and were obtainable immediately from Hughes. The NHA for every launcher drawing is contained in the Numerical Document List (NDL), and is on file in JSPO, and was provided to potential bidders. Not withstanding the above, JSPO is requiring Hughes to place the NHA on all drawings. Over 80 percent of the launcher drawings now meet this requirement. The remaining drawings will depict the NHA, when the drawing is next revised.

8 Page 15. Engineering Data Management Plan. The statement in the 2nd sentence, 2nd paragraph, that the lack of coordinating the Engineering Data Management Plan (EDMP) with Warner-Robins Air Logistics Center (WR-ALC) affected the timing of the conduct of the PCA is misleading and resulted from relying on an input from one individual at WR-ALC that did not understand program or configuration management requirements. The EDMP does not address the timing requirement for the conduct of a PCA. AFR 14-1, AFLC/AFSCP 800-7, and MIL-STD-1521A specify when a PCA will be conducted. WR-ALC does not control when a PCA is conducted. MIL-STD-1521A, paragraph 60.1.1, states, "The PCA shall be conducted on the first article of CIs..." The launchers were being produced, and delivered to the field. Therefore, the JSPO was correct in performing the PCA and establishing the product baseline when it did.

9 Page 16. Effect on AMRAAM Program. The statement that configuration problems caused a delay in the planned competitive acquisition of launchers and the loss of $39 million savings is totally inaccurate. The competition was delayed because the Lot I/II design did not fully comply with the allocated baseline (development specification) and had to be redesigned. The problem was with the design, not configuration management, configuration control, nor the quality of the drawings. The JSPO considered competing the Lot III production contract and letting the winner accomplish the necessary engineering redesign. Subsequently, this approach was considered too risky and was dropped. The Lot III production contract which required several

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launcher parts to be redesigned, was awarded to Hughes. The concept that the JSPO would have realized an additional $39M in savings by competing the launcher one lot earlier is highly speculative. You can not state that the savings achieved in the Lot IV "Build to Print" contract could have also been achieved in the Lot III contract if it would have been competed. The Lot III contract that the JSPO considered competing required considerable development and redesign. The original estimate of competitive savings for Lots III and IV were $14M and $7.4M respectively based on a 18% competitive savings. The actual competitive savings in Lot IV was $38.5M or 41%, greatly exceeding the original estimate. The competitive pressure generated by the JSPO handling of the acquisition accounts for the enormous increase in savings. The IG report seems inconsistent in accusing the JSPO of losing $39 million because it did not compete the Lot III contract that required considerable redesign to meet the development specification requirements, yet at the same time criticizing the JSPO for the added cost of $1.9 million to the later Lot IV co-producer contract for incorporating later design changes that were not available at contract award.

10 Page 17. Part IIA. Launcher Second Source Contract. The contention of an additional $1.9M of lost competitive savings is erroneous. If the drawing changes had been included in the RFP, the bid price would have been different. The JSPO launcher team will conduct a fact-finding and negotiation to develop an equitable adjustment of the contract for the differences.

13 Page 19. Part II. B. Contract Requirements The program office did not insert DOD-STD 1679 or 1679A in lieu of DOD-STD 2167A. The initial software development took place well before DOD-STD 2167 even existed. DOD-STD-2167 came into existence in 1985 and was revised again in 1988 (DOD-STD 2167A). It was determined that the expense associated with forcing the contractor to comply in full with the guidelines of 2167A was not worth the advantages. Instead, a phased-in approach was chosen which is more practical and cost effective. Currently, in Lots IV, V and beyond, the contractor is required to deliver all data items (software and documentation) per the guidelines of 2167A. The entire DOD-STD 2167A was placed on contract as part of the P3I Program.

13 Page 20. Part II. B. Computer Resources Life Cycle Management Plan Since the inception of the AMRAAM Program, the missile software has been managed via the Computer Resource Integrated Support Plan (CRISP) / Software Life-Cycle Management Plan (SLCMP). Contrary to the statement made in the last sentence of this section, this plan was revised, signed and approved well before the May 1991 DAB meeting and a copy provided to the IG. There is no established requirement to convert the CRISP/SLCMP into the Computer Resources Life Cycle Management Plan (CRLCMP) format. Despite this, the JSPO, per direction from the Computer Resource Working Group, has chosen to transition the document

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into the CRLCMP format to reflect the current requirements of AFR 800-14.

14 Revised

Page 21. Part II. B. Computer Resources Life Cycle Management Plan The statement "...the 28 missile computer programs..." is in error. There are not 28 programs that make up the missile software but rather one. This Operational Flight Computer Program, sometimes referred to as the air vehicle software, is governed by one CSCI. This program is stored in a set of 24 Programmable Read Only Memory (PROM) devices. The software accesses an additional four PROMs which contain the Autopilot Look Up Table, the Radome Error Slope Table and Operand Memory.

14 Revised

Page 22. Part II. B. Effect on the AMRAAM Program The statement "...the 27 nontactical computer programs." is in error. There does not exist 27 nontactical computer programs in the AMRAAM software. The one tactical computer program is routinely provided to the IV&V Agent (PMTC) for review and they continue to review all subsequent revisions. What this Draft Audit Report may be addressing are the floppy disks that contain the information necessary to burn the PROMs. It is important to note that these are not "programs". They merely contain the information needed for the PROM Burner to transfer the software, which has already been thoroughly analyzed and tested, onto the chip. The process for generating the PROM configurations from the tactical software is automated with built in check-sums.

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Page 25. Part IIC. Contract Consideration. The statement that the JSPO did not obtain consideration for delivery extensions and approved deviations and waivers is erroneously broad, misleading, and totally inaccurate. As discussed in the response to the recommendations, consideration was received where warranted. The change in specifications necessitated by the F-15 fuselage environment made it virtually impossible to completely detail all the factors contributing to the schedule delays. A highly professional team evaluated the schedule delay factors and negotiated equitable adjustments to the contract when the facts were known. The contention that these schedule extensions will result in a $8M increase in cost due to inflation is in error, as inflated dollars will be used to pay the inflated costs. Contractor late deliveries actually result in lost contractor profits on FFP contracts as the contractor receives more highly inflated dollars than he assumed when the contract was awarded. The conclusion that should be drawn from the Appendix C calculations is that the Air Force saved $8M since they should have used a higher inflation index for computing Lot IV costs.

25

Page 35. Part IID. Missile Interchangeability. The statement that "the program office did not consider using one contractor to perform interim contractor support...." is incorrect. In a letter dated 1 Sep 87, subject: Depot Maintenance Planning - Assured System Availability, the recommendation was made to break out ICS from the production contracts beginning with the second year of ICS and competing between Hughes and Raytheon. The

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recommendation was based on the economic benefits of competition and the fact that it would be easier to transition to organic capability from one contractor rather than two contractors each repairing their own missiles. This letter was addressed to YM and the three letter directorates within YM. The following concerns resulted in the disapproval of ICS competition by the Program Director: (1) concerns regarding missile configuration changes, (2) concerns that the contractors would price the uncertainty of changes and support only precise configurations, and (3) concerns that going to one contractor would drive the requirement for additional test equipment not required if repair was split between the two contractors.

The concept of using one contractor for maintenance support and realizing substantial savings is not valid. While the missile components are form, fit, and function identical, there are significant differences below the interchangeable level. Test equipment rates and configurations at each contractor's facility must be considered. Until the AMRAAM depot maintenance concept is finalized (DAB IIIB ADM has directed no depot funds be expanded until OSD reviews a potential change in the AMRAAM maintenance concept) a change to the current ICS concept is not prudent.

25 Page 36. Performance of the Interchangeability Configuration Audit Demonstration (ICAD). As discussed in the response to recommendation D.2 the ICAD is not currently planned and is not budgeted. The statement that the Air Force will unnecessarily spent $4.4M to perform ICAD in Lot VI is not correct.

31 Page 43. Part IIE. Contractor Support and Program Office Staffing. The DOD IG has incorrectly interpreted the definition of CAAS (see response to recommendation E.1). The AMRAAM JSPO is in compliance with all directives concerning CAAS and is using prudent staffing practices in the current personnel management environment. The entire Part IIE section should be deleted.

10 3. **Recommendation A.1** Issue a letter to Hughes Aircraft Company advising it of the contract requirement to submit all missile launcher engineering changes to the program office's configuration control board for review and approval, as stated in Military Standard 480B.

Nonconcur. A letter is not needed as Hughes has and does submit all Class I ECPs to the JSPO for approval/disapproval and all Class II changes to the DPRO for concurrence in classification when the appropriate baseline has been established and is affected. Prior to award of the Lot III launcher contract, the functional, allocated, and product baselines for the Lot I and II launchers were established. The specifications and detailed design drawings were under government control. Several parts in the Lot I/II design (product baseline) did not meet the allocated baseline (Part I, development specification).

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The Lot III contract statement of work required Hughes to redesign several parts to meet the Part I specification. For those areas/parts that Hughes was to redesign, it was the JSPO's intent from the outset to allow Hughes the latitude to redesign the hardware piece parts without government approval in order to meet the Part I development specification requirements. The intent was to re-establish the drawings as part of the product baseline at the Lot III Physical Configuration Audit. This has been accomplished. The product baseline on the Lot III launcher has been established and all changes are processed in accordance with AFR 14-1 and MIL-STD-480B.

10 **Recommendation A.2** Identify all of the engineering changes that Hughes Aircraft Company made to the launcher design without program office review and approval, and review and approve identified engineering changes in accordance with procedures in Military Standard 480B.

Concur with the intent. The JSPO already has copies of all launcher changes made by Hughes. For the past two years Hughes has been contractually required to submit, biweekly, copies of all released changes to the JSPO for information and review. This includes the Lot III Class II changes not signed by the government during the period of time that Hughes was allowed to redesign specified parts of the Lot III product baseline (drawing part only) in order to meet the Part I development specification requirements. The drawing portion of the Lot III product baseline has been established and validated at the PCA. All Class II changes are signed by the local DPRO. No Class I changes to the Part I or Part II specifications, controlled by the allocated or product baseline, have been made without JSPO JCCB approval.

10 **Recommendation A.3** Coordinate the engineering data management plan with Warner-Robins Air Logistics Center, as required by Air Force Regulation 800-34, "Engineering Data Acquisition."

Concur. The Engineering Data Management Plan is currently undergoing revision and the revised version will be coordinated with Warner-Robins Air Logistics Center. This update is scheduled to be completed in January 1992.

14 4. **Recommendation B.1** Include Department of Defense Standard 2167A, "Defense System Software Development," in all future missile production contracts.

Concur. The JSPO had incorporated DoD Standard 2167A into the new AMRAAM P3I contract prior to the IG audit. Additionally, 2167A is also being incrementally incorporated on all **new** software developed under the production contracts starting with Lot III.

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14 Revised

Recommendation B.2 Update the Computer Resources Life Cycle Management Plan to describe each of the 28 programs that make up the missile software, including its storage and role in relation to each of the 14 major functions of the missile software, as required by AFR 800-14.

Nonconcur. Missile software is not comprised of 28 programs as indicated in the IG Report. A single Operational Flight Computer Program, sometimes referred to as the air vehicle software, is governed by one computer software configuration item (CSCI). This program is stored in a set of 24 Programmable Read Only Memories (PROMs). The software also accesses an additional 4 PROMs which contain the Autopilot Look Up Table, the Radome Error Slope Table and Operand Memory. In the next revision of the CRLCMP scheduled for February 1992, the JSPO will provide a more detailed summary of the role of these PROMs in relation to the missile software.

Deleted

Recommendation B.3 Provide the independent verification and validation agent the documentation for the 27 nontactical computer programs to enable a review and validation of the missile software, as required by AFR 800-14.

Nonconcur. As previously stated, the air vehicle software represents a single CSCI. This single tactical computer program is routinely provided to the IV&V Agent, Pacific Missile Test Center (PMTC), for review each time the program is revised. The IG's recommendation may be addressing the floppy disks that contain the information necessary to burn the PROMs. It is important to note that these are not "programs". They merely contain the information needed for the PROM burner to transfer the software, which has already been thoroughly analyzed, onto the chip. The process for generating the PROM configurations from the tactical software is automated with built in check-sums. Little can be achieved by additional reviews of this data and documentation.

20

5. **Recommendation C.1** Analyze and document the reasons for late missile deliveries on production lots 1 through 3, determine the cost effects on subsequent missile production contracts, and negotiate appropriate consideration with Hughes Aircraft Company.

Nonconcur. The referenced schedule slips were driven in large part by hardware changes resulting from missile performance problems identified during the F-15 Captive Carry Reliability Program. Due to the nature of these hardware problems, the JSPO could not determine if the contractor had not met contractual requirements or the actual F-15 environments exceeded contract requirements. Until a determination of responsibility was made, the JSPO decided that it was appropriate to extend the production delivery schedule pending resolution of the problem. When the government determined that the F-15 flight environment exceeded contractual requirements, the contract was modified accordingly.

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Further schedule changes resulted from delays in DAB approval of Lot IV full go-ahead. The Lot III delivery schedule was rebaselined to prevent a production gap which would have increased program cost.

20 **Recommendation C.2** Implement the guidance in the Armed Service Procurement Manual to determine and document events affecting delivery schedule slippages so that consideration can be fairly and objectively negotiated.

Concur. This is the standard procedure within the JSPO which has been and will continue to be followed in contractual dealings.

21 **Recommendation C.3** Implement the requirement in Air Force Regulation 14-1, "Configuration Management," by obtaining consideration in return for each approved deviation or waiver and by identifying the rationale for the consideration on Department of Defense Form 1694, as required by Military Standard 480B, "Con-figuration Control-engineering Changes, Deviations and Waivers."

Concur with the intent. This has already been accomplished. The proper use of the Requests for Deviations/ Waivers (RD/Ws) is to document a temporary deficiency or reduction in the specification or drawing requirements. Initially, Hughes incorrectly used the RD/W as a method to expedite a revision to the contract requirements while also processing an ECP/TCP to permanently change the requirement. This practice is no longer allowed. Since Lot I was the first production lot, most of the RD/Ws submitted corrected inconsistencies in the specification (incorrect tolerances or discrepancies between specs and MIL STDs). Many of the RD/Ws offered improvements over the initial requirements. The RD/Ws were submitted to expedite delivery while TCPs/ECPs were being processed. All of the RD/Ws incorporated into the Lot I contract were supported by a JSPO evaluation that concluded that for most of the RD/Ws there was no cost impact or degradation in performance nor was there an impact for either party. These RD/Ws for the most part, corrected or improved upon the Government specification. For the RD/Ws that documented a degradation in system performance, the technical evaluation identified consideration due to the government. For example, RD/W A9CW048R1, "RF Processor External Source," the technical evaluation recommended the amount of consideration should be $368K. The three examples cited in the report were evaluated by both the AFPRO and the JSPO and both agreed there was no performance degradation or cost impact. In one case the contractor proposed, and the Government accepted, additional testing to ensure function was not impaired. The Government concluded that form, fit, and function were not impaired and it was in the Government's best interest to accept the RD/W with additional testing conducted by the contractor as consideration.

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The Air Force believes that the requirements of FAR 46.407 have been met.

28 6. **Recommendation D.1** Compete FY 1994 and FY 1995 interim contractor support requirements between Hughes and Raytheon.

Nonconcur. While the JSPO agrees that competed ICS is feasible, they do not agree that it is a low risk effort. The JSPO has recently completed a study directed by the Defense Acquisition Board in the 29 May 91 Acquisition Memorandum. The study addressed the need for an organic depot capability vs contractor support for the life of the system. Competing ICS at this time could reduce any flexibility to comply with OSD direction. The JSPO will readdress this concept after the study is evaluated.

28 **Recommendation D.2** Cancel the planned Interchangeability Configuration Audit Demonstration.

Concur with the intent. The Interchangeability Configuration Audit Demonstration (ICAD) is still being considered for a future lot. The JSPO had initially planned to conduct the demonstration during Lot I, however, the ICAD plan was never placed into effect. Since the JSPO is currently not on contract for an ICAD no action is required. They will only issue a contract at a later date if the need for an ICAD becomes clear.

34 7. **Recommendation E.1** Report the Advanced Medium Range Air-to-Air Missile program's technical and engineering acquisition support effort as contracted advisory and assistance services, as required by Office of Management and Budget Circular A-120, "Guidelines for the Use of Advisory and Assistance Services," January 4, 1988.

Nonconcur. Air Force Contracting Officers determined that certain AMRAAM contract support was contracted Advisory and Assistance Services (CAAS), and was reported as required. Appropriate budgetary controls were applied to those efforts in accordance with Federal Acquisition Regulations (FAR) 37.204 (e) & (r), which reads in part: "Engineering and technical services" are specifically excluded or exempted from the definition of advisory or assistance services. Therefore, they were not reported as CAAS. Furthermore, the "Technical and Engineering Acquisition Support" (TEAS) contractor personnel do not provide management services. They do, however, provide technical assessments and recommendations to the AMRAAM program office. Decision authority rests with the government. The AF conducted several studies prior to contracting for TEAS. The results of these studies were briefed to Air Force Systems Command and HQ United States Air Force. They provided justification for additional technical and engineering support personnel required for the then "Air Force Armament Division" program offices. The need was validated and authorization was obtained to proceed with the TEAS

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contract. The need for augmenting the technical staff was revalidated in 1990 with the AFSC and SAF/AQ approval of the Acquisition Plan for the TEAS recompetition. The TEAS services currently under contract are not CAAS per FAR 37.2.

34 **Recommendation E.2** Evaluate the Advanced Medium Range Air-to-Air Missile office's staffing to determine whether reliance upon support contractors is cost-effective and appropriate.

Nonconcur. The manning of the AMRAAM program office has been the subject of numerous reviews by the commander of the Munitions Systems Division and most recently by the Commander of the Aeronautical Systems Division in view of the Air Force manning reductions brought about by the Defense Management Review (DMR) and the FY 92 President's Budget drawdown. The Program Director and the ASD Commander have agreed that the manning level and mix is appropriate for the current stage of program maturity, with the exception of several positions in the Contracting Office. As the program continues through its life cycle, the mix and levels of personnel manning will be reviewed. The current mix is considered cost effective in view of the current turbulence of the government manning situation.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

In the following paragraphs, we are responding to management's comments on the factual content of the report.

Other Matters of Interest

Baseline reporting. We deleted from the final report the discussion on baseline reporting. Management was correct in stating that changes being considered and reflected in Planning, Programming, and Budgeting System memorandums may not be reported until approved and included in the President's budget.

Cost estimating. The Deputy Assistant Secretary's comments that the Air Force and OSD Cost Analysis Independent Groups concurred with the program office's position to exclude costs from its estimate is contrary to OSD policy and Air Force guidance. DoD Directive 5000.4, "OSD Cost Analysis Improvement Group," October 30, 1980, states that program cost estimates should include all elements of system life-cycle costs, including research and development, investment, and operating and support. The Directive states that all related procurements, such as modifications to existing aircraft, should be estimated regardless of funding source or management control. In addition, Air Force Systems Command guidance to the AMRAAM program office stated that the independent and program office cost estimates should be identical for estimating cost elements and that there should be no unique cost elements in either estimate. The costs cited in our report were costs associated with the AMRAAM, as identified in the independent cost estimate and therefore should have been included in the program office estimate.

Finding A, Missile Rail Launcher Configuration Control

Missile rail launcher and configuration control. The Deputy Assistant Secretary's contention that Military Standard 480B allowed the AMRAAM program office to tailor configuration baseline management requirements after the Government accepts control of the design baseline is incorrect. The Military Standard 480B paragraph referenced by the Deputy Assistant Secretary allows the program office to tailor application of requirements in the Military Standard before the Government accepts control of the design baseline.

In addition, the AMRAAM program office did lose configuration control over the launcher design baseline as discussed in the finding. A launcher drawing review team made up of personnel from the Pacific Missile Test Center identified that Hughes made two Class I launcher design changes without Government

approval. The Hughes Class I launcher design changes concerned a change in the type of metal used for the launcher supports and a one-degree taper elimination on the launcher.

Baseline documentation. The Deputy Assistant Secretary was correct in stating that the launcher baseline design can be established before a completely acceptable level 3 technical data package is available. Military Standard 480B states that the product baseline is established based on the detailed design documentation (normally level 3 drawings) describing all of the necessary functional and physical characteristics for each configuration item. In addition, Military Standard 483A, "Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs," June 4, 1985, states that the kind and detail to be contained in the product configuration identification shall be determined in consideration of requirements for the anticipated method of reprocurement.

As discussed in the finding, the AMRAAM program office established the product baseline for the launcher before acceptable level 3 drawings were available to adequately support the competitive acquisition of the launcher, the planned method of reprocurement. In this respect, inadequacies in the technical documentation did present reprocurement obstacles. The AMRAAM program office received 12 letters from the second source contractor documenting deficiencies in the detailed design documentation. As a result, the second contractor submitted an additional cost claim of $1.9 million to cover the cost of analyzing the drawing package and incorporating design changes.

Engineering Data Management Plan. The Deputy Assistant Secretary was correct in stating that Warner-Robins Air Logistics Center (supporting command) does not control when a physical configuration audit is conducted. However, good management practices would dictate that the AMRAAM program office obtain input from the developmental tester and the logistics supporting command concerning the readiness of the launcher technical documentation for a physical configuration audit. The physical configuration audit is the means of establishing the product baseline and is used for the acceptance of production units. Accordingly, the Military Departments are responsible for ensuring that acceptance testing requirements in the technical documentation are adequate for acceptance of production units by Government quality assurance activities. Therefore, we do not believe it was unreasonable for the supporting command to expect that the AMRAAM program office would coordinate with it when the physical configuration audit was performed to facilitate an orderly transition of logistical support responsibilities for launcher production units.

We do not take issue with the Air Force's rationale that since launcher production had occurred, the AMRAAM program office was

correct in performing the physical configuration audit. However, the availability of acceptable technical documentation should have formed the basis for performing the physical configuration audit.

Effect on AMRAAM program. We clarified the report to state that Hughes "launcher design problems" caused the planned competitive acquisition of the launcher to be delayed.

In reference to lost competition savings, the report was consistent. Hughes' failure to produce acceptable level 3 drawings in accordance with the AMRAAM program office's acquisition strategy did cause the loss of planned competition savings for lot 3 and may result in a loss of identified competitive savings for lot 4.

Finding B, Internal Controls Over Missile Software Development

Contract requirements. We modified the report in response to management comments.

Computer Resources Life Cycle Management Plan. We deleted from the final report the statement that the Computer Resources Life Cycle Management Plan was not revised and approved before the May 1991 DAB meeting. The draft revised Plan, dated February 1990, was still in coordination at the completion of our field work in March 1991. The plan was approved in April 1991, shortly before the May 1991 DAB meeting.

We agree that the missile software did not consist of 28 separate programs. Accordingly, we clarified the report to state that the missile software consisted of the operational flight program, which was stored on 24 PROM devices within the missile computer memory and on another 95 PROM devices outside of the missile computer memory that were accessed by the operational flight program to control the missile flight.

Effect on the AMRAAM program. We clarified the report in response to management comments.

Finding C, Contract Consideration

We disagree with management's comments that consideration was obtained for delivery extensions and deviations and waivers. We examined the official contract files provided by program office personnel and determined that no documentation existed identifying consideration received for delivery schedule extensions on production lots 1 through 3. Also, as stated in the finding, consideration was received for only 3 of 202 major deviations and waivers. In addition, we continue to maintain that the delivery schedule extensions did cost the Air Force an additional $8 million because the missile delivery schedule

delays in production lots 1 through 3 delayed contract negotiations for lot 4 production quantities.

Finding D, Missile Interchangeability

Missile interchangeability. The Deputy Assistant Secretary was correct in stating that the program office considered competing interim contractor support in September 1987. At that time, the AMRAAM Program Director disapproved competing interim contractor support based on technical, cost, and test equipment concerns. However, the AMRAAM program office did not recognize reductions in technical, cost, and test equipment concerns since FY 1987 or address the feasibility of competing interim contractor support when updating the Integrated Logistics Support Plan in FY 1991. As discussed in the finding, Hughes and Raytheon have successfully demonstrated limited interchangeability for missile components, subassemblies, chassis, missile sections, and special test equipment since FY 1987. As a result, we feel that our statement that the "program office did not consider using one contractor to perform interim contractor support," was correct.

In respect to competition savings, we disagree with management's conclusion that using one contractor for maintenance support would not result in savings. The Competition in Contracting Act of 1984 was enacted because historically increased contractor competition resulted in lower overall contract costs.

In reference to contractor maintenance capabilities, the Air Force was correct in stating that test equipment rates and configurations at each prime contractor's facility must be considered before a decision is made to compete interim contractor support. In this regard, the AMRAAM program office had not determined and considered the maintenance capabilities of either prime contractor as of May 31, 1991.

In reference to AMRAAM depot maintenance, we do not agree with management's contention that the Air Force study addressing the need for an organic (in-house within DoD) depot capability should be a factor in the decision to compete interim contractor support. Regardless of the study results, the AMRAAM program office will require interim contractor support through FY 1995. OSD has projected that a full organic depot capability will not be in place until FY 1996 at the earliest.

Performance of the interchangeability configuration and demonstration. The Deputy Assistant Secretary incorrectly stated the AMRAAM program office did not plan to perform the ICAD in the production lot 6 contract. During the audit, we obtained program office documentation, dated March 28, 1991, that identified that the ICAD was being planned for production lot 6. Although we did not specifically identify the ICAD in the AMRAAM budget for

FY 1995, the AMRAAM program office would have to use funds in that budget year to perform the planned ICAD. Accordingly, we concluded that the Air Force would unneccessarily spend $4.4 million if the ICAD was performed.

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