Audit Report

OFFICE OF THE INSPECTOR GENERAL

FUNCTIONAL AND PHYSICAL CONFIGURATION AUDITS OF THE AIR FORCE RAPID EXECUTION AND COMBAT TARGETING PROGRAM

Report No. 96-073 February 16, 1996

Department of Defense

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Acronyms

CCB	Configuration Control Board
DCMAO	Defense Contract Management Area Operations
DCMO	Defense Contract Management Office
FAR	Federal Acquisition Regulation
FCA	Functional Configuration Audit
ICD	Interface Control Document
LCC	Launch Control Center
PCA	Physical Configuration Audit
PCO	Procuring Contracting Officer
PEO	Program Executive Officer
REACT	Rapid Execution and Combat Targeting

INSPECTOR GENERAL
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February 16, 1996

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

SUBJECT: Audit Report on Functional and Physical Configuration Audits of the Air Force Rapid Execution and Combat Targeting Program (Report No. 96-073)

We are providing this audit report for information and use. This report is the second in a series of reports resulting from our audit of functional and physical configuration audits of Defense systems. We considered comments on a draft of this report in preparing the final report.

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

We appreciate the courtesies extended to the audit staff. Questions on the audit should be directed to Mr. John E. Meling, Audit Program Director, at (703) 604-9091 (DSN 664-9091) or Mr. Jack D. Snider, Audit Project Manager, at (703) 604-9087 (DSN 664-9087). See Appendix H for the report distribution. The audit team members are listed inside the back cover.

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Office of the Inspector General, DoD

Report No. 96-073 **February 16, 1996**
(Project No. 5AE-0032.01)

Functional and Physical Configuration Audits of the Air Force Rapid Execution and Combat Targeting Program

Executive Summary

Introduction. The Rapid Execution and Combat Targeting (REACT) Program is an equipment and software upgrade to Minuteman III launch control centers to improve intercontinental ballistic missile war fighting responsiveness and flexibility, emergency war order effectiveness, and weapon system operability and supportability. The Air Force plans to upgrade 50 launch control centers and 4 test facilities with REACT consoles and acquire 13 REACT consoles as trainers for an estimated total program cost of $640 million. As of January 29, 1996, the Air Force had upgraded 34 of the 50 launch control centers and the 4 test facilities. All upgrades are scheduled to be completed by August 1996.

Audit Objective. The primary audit objective was to evaluate the adequacy of the functional and physical configuration audit process for the acquisition of the REACT console. We evaluated whether functional and physical configuration audits verified and documented that configuration items agree with their configuration identifications and were complete, accurate, and satisfied program requirements. We also evaluated the management control program as it related to our audit objective. The REACT Program is one program reviewed in our ongoing audit of management of functional and physical configuration audits of Defense systems.

Audit Results. The functional and physical configuration audit processes for the REACT Program need improvement.

o The REACT Program Office used out-of-date interface control documents to perform REACT formal qualification tests. The test results were used to certify the successful completion of the REACT functional configuration audits. As a result, the Program Office had to obligate an additional $1.1 million to redesign and retrofit affected REACT console hardware items and had to conduct another functional configuration audit for those items (Finding A).

o The REACT Program Office did not adequately document its technical reviews and did not perform cost and price analyses to assess the adequacy of cost reductions and other consideration offered by the contractor for waivers of contract specifications. As a result, the Program Office had no assurance that the Government was compensated adequately for eight waivers, totaling $439,000 (Finding B).

Recommendations in this report, if implemented, will improve the functional and physical configuration audit process for the REACT Program. We did not identify any material management control weakness applicable to our primary audit objective. Appendix F summarizes the potential benefits of the audit.

Summary of Recommendations. We recommend that the REACT Program Manager assign a higher priority to maintaining current interface control documents and obtain equitable price adjustments or other consideration in return for approving waivers of specifications based on documented cost and price analyses.

Management Comments. We received comments to a draft of this report from the Program Executive Officer, Bombers, Missiles and Trainers. He concurred with the recommendations, commented on statements in Finding A, and discussed the configuration management process associated with the REACT Program. See Part I for a summary of management comments and Part III for the complete text of management comments.

Audit Response. The Program Executive Officer's comments were responsive to our recommendations. In response to the Program Executive Officer's comments, we made appropriate changes to Finding A.

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Part I - Audit Results

Audit Background

This report discusses the adequacy of the functional and physical configuration audit process for the Rapid Execution and Combat Targeting (REACT) hardware. A functional configuration audit (FCA) is the formal examination of functional characteristics of test data for configuration items to verify that the item has achieved the performance specified in its functional or allocated baseline. A physical configuration audit (PCA) is a formal examination to verify that the configuration item "as built" conforms to the technical documentation that defines the item. Appendix B provides definitions of technical terms used in this report.

Rapid Execution and Combat Targeting Program. The REACT Program upgrades the Minuteman III launch control centers (LCCs) to improve intercontinental ballistic missile war fighting responsiveness and flexibility, emergency war order effectiveness, and weapon system operability and supportability. The REACT Program modifies equipment and software at the LCCs to permit more efficient two-crew-member console (workstation) operations, improve missile retargeting capabilities, and provide rapid message processing capabilities. The REACT Program is divided into two elements: an upgrade of the Weapons System Control Element (Control Element) for the launch-control-center consoles and development of the Higher Authority Communications/Rapid Message Processing Element (Processing Element). The development contractors for the Control Element and the Processing Element were Loral Command and Control Systems (Loral), Colorado Springs, Colorado, and General Telephone and Electronics, Government Systems Division, Needham, Massachusetts, respectively.

In July 1991, the Air Force awarded the production contract for the launch-control-center consoles to Loral. The consoles consist of AM and B configurations and differ primarily on the method of communication between the LCC and the launch facility. The AM configuration uses cable while the B configuration uses radio frequencies and cable for communicating. The Air Force plans to upgrade 50 LCCs and 4 test facilities with REACT consoles and acquire 13 REACT consoles as trainers at an estimated total program cost of $640 million. For the 67 consoles, 58 are AM and 9 are B configurations. As of January 29, 1996, the Air Force had upgraded 34 of the 50 LCCs with AM consoles and 4 test facilities with AM and B consoles. All upgrades are scheduled to be completed by August 1996. Appendix C shows a diagram of the REACT console.

Configuration Audit Guidance. DoD guidance for performing functional and physical configuration audits is in DoD Instruction 5000.2, "Defense Acquisition Management Policies and Procedures," February 23, 1991, and various military standards. Currently, this guidance is being revised. Appendix D discusses DoD guidance and proposed revisions.

Audit Objective

The audit objective was to evaluate the adequacy of the functional and physical configuration audit processes for the acquisition of the REACT console. Specifically, we determined whether functional and physical configuration audits:

o verified and documented that configuration items agreed with their configuration identifications and

o were complete, accurate, and satisfied program requirements.

We also evaluated the management control program as it related to our audit objective. Our evaluation of management controls was limited as a result of Inspector General, DoD, Report No. 96-028, "Implementation of the DoD Management Control Program for Major Defense Acquisition Programs," November 28, 1995, that evaluated the effectiveness of the management control program that the Defense Acquisition Executive and the Service Acquisition Executives used for major Defense acquisition programs.

The REACT Program is one program reviewed in our ongoing audit of management of the functional and physical configuration audits of Defense systems. In Appendix A, we discuss the scope and methodology used to accomplish the objective as well as management controls and prior audit coverage.

Finding A. Updating Interface Control Documents

The REACT Program Office used out-of-date interface control documents (ICDs) to perform REACT formal qualification tests because the Program Office assigned a low priority to maintaining current interface documentation for formal qualification tests. To certify the successful completion of the REACT functional configuration audits, the Program Office relied on the results of the formal qualification tests. As a result:

o the Program Office had to obligate an additional $1.1 million to redesign and retrofit affected REACT console hardware items,

o the Program Office had to conduct two additional functional configuration audits for the redesigned and retrofitted REACT console hardware items, and

o LCC consoles may not perform properly when LCC operators are controlling the operation of the weapon systems within the intercontinental ballistic missile environment without the Program Office maintaining current ICDs.

Configuration Audit and Interface Control Guidance

Configuration Management Guidance. Configuration management and interface control guidance is in DoD Instruction 5000.2; Military Standard 483A, "Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs," December 31, 1990; Military Standard 973, "Configuration Management," April 17, 1992; and Military Standard 1521B, "Technical Reviews and Audits for Systems, Equipments, and Computer Software," June 4, 1986.

DoD Instruction. The DoD Instruction 5000.2, part 9, section A, "Configuration Management," states that configuration audits will verify and document that the configuration item and its configuration identification agree, are complete and accurate, and satisfy program requirements.

Military Standard 483A. Military Standard 483A requires that ICDs be:

o completed and approved by the originator in time to support the participating contractor's preliminary design review;

o released by the originating contractor, signed by the interfacing participants, and approved by the Interface Control Working Group Chairman before the critical design review; and

o completed, approved, and released before the physical configuration audit.

Military Standard 973. Military Standard 973 requires the contractor to verify that:

o the configuration status accounting system provides for the traceability of all changes from the initial baseline documentation of each configuration item,

o the interface requirements for the system and its configuration items are a part of the system engineering process, and

o the various hardware and software configuration items are compatible and interoperable with the interface specified in the allocated baseline configuration documentation.

Military Standard 1521B. Military Standard 1521B requires that, when configuration item qualification can only be determined through integrated weapon system testing, the program office will consider the functional configuration audit complete for the configuration item after completion of integrated testing.

Configuration Audits. Because the REACT console contains complex configuration items, the REACT Program Office and Loral used test results from formal qualification tests of the configuration items to assist in determining whether the items had successfully completed the REACT functional configuration audits. To accomplish the formal qualification testing, the REACT Program Office and Loral used ICDs that showed the configuration of the intercontinental ballistic missile environment.

Completion of Functional Configuration Audits

The REACT Program Office used out-of-date ICDs to perform REACT formal qualification tests. The test results were used to certify the successful completion of the REACT functional configuration audits. This condition occurred because the REACT Program Office assigned a low priority to maintaining current interface documentation for formal qualification tests. For example, the Program Office did not verify that the ICDs for the REACT Program were current and updated for the formal qualification tests of the voice control panels on the AM and B configurations and the auxiliary alarm panel on the B configuration. Consequently, when Loral conducted the formal qualification test, the test results were based on ICDs that did not accurately show the current operational configuration of the LCCs.

Subsequently, the REACT Program Office conducted site surveys and analyses after the REACT console hardware experienced weapon system integrated test failures on the voice control and the auxiliary alarm panels. For the voice

control panels, the Program Office detected problems such as poor audible quality from the receivers and speakers and random performance malfunctions. For the auxiliary alarm panel, the Program Office determined that the indicator buttons were not producing the specified performance because of random electrical signals within the console.

The site surveys and analyses determined that Loral used out-of-date ICDs for the functional configuration of the LCCs during the formal qualification testing. For the voice control panels, the REACT Program Office had not updated the ICD for the phone line frequency connectors before the formal qualification test. For the auxiliary alarm panel, the Program Office had not updated the ICD to show the current internal voltages before the formal qualification test. As a result, Loral had to simulate the requirements for the phone line frequency and internal voltages based on out-of-date ICD requirements.

Effect of Using Outdated Interface Control Documents

Because the REACT Program Office did not maintain current ICDs, it had to obligate an additional $1.1 million to redesign and retrofit REACT console hardware configuration items. Further, the Program Office had to conduct two additional functional configuration audits for the voice control and the auxiliary alarm panels. Redesign and retrofit costs amounted to about $0.8 million for the voice control panels and about $0.3 million for the auxiliary alarm panel.

Normal LCC console operations depend on current ICD specifications to accomplish the intended mission. Without current ICDs, the LCC consoles may not perform properly when LCC operators are controlling the operation of the weapon systems within the intercontinental ballistic missile environment. Further, the present emphasis within DoD is to upgrade its current weapon systems instead of procuring new systems. Therefore, up-to-date ICDs must be maintained for normal LCC console operations as well as formal qualification testing for configuration items used to support the successful accomplishment of functional configuration audits.

Recommendations, Management Comments, and Audit Response

A. We recommend that the Rapid Execution and Combat Targeting Program Manager assign a higher priority for maintaining current interface control documents so that they will show the most recent changes within the intercontinental ballistic missile environment for use during normal launch-control-center console operations, configuration item upgrades, and future functional configuration audits.

Management Comments. The Program Executive Officer, Bombers, Missiles and Trainers (the PEO), concurred with Recommendation A., stating that ICD maintenance has been assigned a higher priority and ICD changes will be posted to the appropriate documents when cost-effective and under the control of the Air Force Ogden Air Logistics Center in Ogden, Utah. The PEO also addressed statements in the finding. For maintaining ICDs, he stated that it was more cost-effective to handle minor inaccuracies in the ICDs through a development or modification program than to implement a tremendously expanded ICD maintenance process. He noted that the Intercontinental Ballistic Missile System Program Office (the System Program Office) routinely identifies all affected hardware and software interfaces and updates ICDs as necessary before initiating any major intercontinental ballistic missile system upgrades or modifications. Further, he noted that the System Program Office has been using this process since the inception of the System Program Office and is incorporating the process into its business-practice documentation. In reference to the effect of out-of-date ICDs on LCC operations, the PEO stated that LCC operators do not use the ICDs to accomplish their mission. The complete text of the PEO comments is in Part III.

Audit Response. We consider the PEO comments responsive. In reference to ICD changes, the Air Force Ogden Air Logistics Center has responsibility for controlling and making all changes to ICDs affecting the REACT program. Based on the PEO comments, we revised the paragraph concerning the LCC operators control of weapon system operations to show the effect out-of-date ICDs have on the consoles that the LCC operators use.

Finding B. Managing Waivers and Deviations

The REACT Program Office did not adequately document its technical reviews and did not perform cost and price analyses to assess the adequacy of cost reductions and other consideration offered by Loral for waivers of contract specifications. This condition occurred because the REACT Program Office and Loral agreed on consideration for the waivers without requesting the procuring contracting officer (PCO) to evaluate the consideration, including supporting documentation, and to modify the contract to provide for an equitable price adjustment or other consideration. As a result, the Program Office had no assurance that the Government was compensated adequately for eight approved waivers, totaling $439,000, and subsequent waivers and deviations.

Waiver and Deviation

Waiver and Deviation Guidance. Waiver and deviation guidance is in the Federal Acquisition Regulation (FAR) and Military Standard 480B, "Configuration Control Engineering Changes, Deviations, and Waivers," July 15, 1988.

Federal Acquisition Regulation. The FAR, subpart 46.407, "Nonconforming Supplies or Services," allows the PCO to accept nonconforming supplies when it is in the Government's best interest. The PCO can accept the nonconforming supplies based upon:

o advice from technical experts that the item is safe to use and will perform its intended purpose;

o information regarding the nature and extent of the nonconformance;

o a request from the contractor for acceptance of the item;

o a recommendation for acceptance or rejection with supporting documentation; and

o contract adjustment considered appropriate, including any adjustment offered by the contractor.

The cognizant contract administration office usually provides this information to the PCO. The FAR subpart also requires the PCO to modify the contract for which nonconforming items are accepted to provide for an equitable price reduction or other consideration. The FAR does not define "other

consideration." For purposes of this audit, we define "other consideration" as compensation or services that the contractor gave to the Government in exchange for approving the waivers designated as consideration.

The FAR, subpart 15.805, "Proposal Analysis," requires that the PCO exercise sole responsibility for the final pricing decision and, as appropriate, coordinate a team of experts in such fields as contracting, finance, law, contract audit, packaging, quality control, engineering traffic management, and contract pricing to evaluate contractor's cost proposals. The PCO makes a cost analysis to evaluate the reasonableness of individual cost elements and performs a price analysis to ensure that the overall price offered is fair and reasonable.

Military Standard. Military Standard 480B requires that a contractor initiate requests for waivers and deviations when contract items have not been, or will not be, built according to contract requirements. The request must include any estimated price adjustment to the contract or, if no change in contract price is warranted, the contractor must explain the lack of any price adjustment.

Configuration Management Plan. The REACT Configuration Management Plan, April 12, 1994, states that the REACT Program Office Configuration Control Board (CCB) is responsible for reviewing waivers and deviations. The CCB processes major and critical waivers and deviations that affect operational items even if the product baseline has not been established. If the REACT Program Office has established a product baseline, Loral submits an engineering change proposal for CCB disposition. The CCB is responsible for recommending approval or disapproval of the waiver or deviation. For each approved waiver or deviation, the CCB notifies the PCO of the actions to be taken. When the PCO is notified of the CCB approval, the PCO provides written direction to Loral indicating formal approval or disapproval and any conditions deemed appropriate.

Analysis of Waivers and Deviation

The REACT Program Office did not adequately document its technical reviews and perform cost and price analyses to assess the adequacy of cost reductions and other consideration offered by Loral for waivers of contract specifications.

From the 12 waivers and 1 deviation (Appendix E) submitted by Loral through May 1995, we determined whether the REACT Program Office had complied with FAR, subpart 46.407, requirements for accepting nonconforming supplies and subpart 15.805, requirements for evaluating consideration.

Waivers Reviewed. Of the 12 waivers, the CCB approved 8; Loral withdrew and canceled the remaining 4. The REACT Program Office valued the cost of those eight approved waivers at $439,000. We determined from discussions with Loral; the REACT Program Office; the REACT PCO; and the Defense

Contract Management Office, Colorado Springs, Colorado, the contract administrator, that virtually no documented evidence existed for the process used to approve the waivers.

o Loral did not identify cost reductions or other consideration being offered in return for the REACT Program Office approving the waivers.

o Except for waiver LCFRW-011, technical experts had not adequately documented their reviews of the nature and extent of the nonconformance and their basis for recommending acceptance or rejection. For waiver LCFRW-011, the technical experts documented the nature and extent of the software fix and their basis for recommending consideration of $9,000 in return for the waiver.

o The PCO neither requested cost proposals from Loral nor performed cost or price analyses for the eight approved waivers.

The PCO prepared approval letters authorizing Loral to implement the eight waivers at no cost to the Government. The letters, however, did not address what cost reductions or other consideration the REACT Program Office would receive from Loral in exchange for granting the waivers. The letters stated that the PCO would issue a modification to the contract for the waivers; however, as of October 1995, the PCO has not yet modified the contract to incorporate any of the eight approved waivers. The REACT Program Office acknowledged that its contract files did not include the required cost and price analyses and agreed to document those analyses in processing future REACT contract waivers.

Deviation Reviewed. For the one deviation, Loral documented that the deviation was minor in nature. As a result, the REACT Program Office did not request consideration. REACT Program Office personnel indicated that the CCB approved the deviation; however, they could not document their review and approval of the deviation.

Effect on Waiver Review and Approval Process

Since the PCO did not perform cost or price analyses on the eight approved waivers and modify the contract to provide for an equitable price adjustment or other consideration, the REACT Program Office had no assurance that Loral adequately compensated the Government for the eight approved waivers, totaling $439,000. Cognizant REACT Program Office and Loral personnel indicated that Loral did provide consideration or other cost reductions to the Government for the approved waivers; however, they could not provide documentation to substantiate such consideration. As a result, we were unable to determine the reasonableness of consideration received for REACT contract waivers. Without the PCO evaluating the consideration, including supporting documentation, for current and future waivers and deviations and modifying the

applicable contract to provide for an equitable price adjustment or other consideration, the Government cannot be assured that it is being adequately compensated for waivers and deviations.

Recommendations, Management Comments, and Audit Response

B. We recommend that the Rapid Execution and Combat Targeting Program Manager:

1. Direct the procuring contracting officer to document consideration received and modify the Rapid Execution and Combat Targeting contracts for the eight waivers and one deviation approved as of October 1995.

2. Direct the procuring contracting officer to evaluate the consideration, including supporting documentation, for future waivers and deviations and to modify the applicable contract to provide for an equitable price adjustment or other consideration in accordance with the Federal Acquisition Regulation, subparts 46.407, "Nonconforming Supplies or Services," and 15.805, "Proposal Analysis."

Management Comments. The Program Executive Officer, Bombers, Missiles and Trainers, concurred with Recommendations B.1. and B.2., stating that the recommendations have been implemented and that documentation for waivers before September 1995 will be completed by May 1, 1996. The complete text of the PEO comments is in Part III.

Part II - Additional Information

Appendix A. Scope and Methodology

This appendix discusses the scope and methodology used to accomplish the objective as well as management controls and prior audit coverage.

Scope

We conducted this audit from January through November 1995 and reviewed data dated from April 1989 through October 1995. To accomplish the objective, we:

o examined the full-scale development contract F04704-91-C-0048, valued at about $155 million, and the production contract F04704-91-C-0037, valued at about $195 million, with Loral, the prime contractor, including statements of work, contract data requirements lists, contract line items, and related correspondence;

o reviewed critical design review minutes at Loral, the REACT Configuration Management Plan, and other REACT Program planning documents;

o reviewed engineering change orders, engineering change proposals, prior effects claims, contract modifications, deficiency notices, waivers, deviations, and Air Force configuration directives;

o reviewed documentation for functional and physical configuration audits on the REACT hardware and software configuration items and the action items generated during those audits; and

o discussed issues relating to the effectiveness of the functional and physical configuration audit process for REACT hardware and software with personnel from the Office of the Secretary of Defense and with program, technical, and contracting officials at Headquarters, Air Force Space Command; Silo-Based Intercontinental Ballistic Missile System Program Office; Air Force Detachment 10, Development Systems Organization; REACT Program Office; Defense Contract Management Area Operations (DCMAO), Denver, Colorado; Defense Contract Management Office (DCMO), Colorado Springs, Colorado; Loral; and TRW [Thompson, Ramo, Woodridge], REACT Program. Appendix G lists the organizations visited or contacted.

Methodology

We conducted this program audit 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 management controls as we deemed necessary. We did not rely on computer-processed data to develop conclusions on this audit. Technical experts from the Technical Assessment Division, Inspector General, DoD, assisted in the review of functional and physical configuration audit documentation for the REACT console. One technical expert, having engineering and configuration management experience, accompanied the auditors on their visits to the REACT Program Office.

Management Control Program

Requirement for Management Control Review. DoD Directive 5010.38, "Internal Management Control Program," April 14, 1987, requires DoD organizations to implement a comprehensive system of management controls that provides reasonable assurance that programs are operating as intended and evaluate the adequacy of the management controls.

Scope of Review of Management Control Program. We limited our review because of relevant coverage in Inspector General, DoD, Report No. 96-028, "Implementation of the DoD Management Control Program for Major Defense Acquisition Programs," November 28, 1995. The report discussed the effectiveness of the management control program that the Defense Acquisition Executive and the Service Acquisition Executives used for major Defense acquisition programs. The report concluded that the acquisition community had not effectively integrated DoD Management Control Program requirements into its management assessment and reporting processes. The report made recommendations to the Under Secretary of Defense for Acquisition and Technology and the Under Secretary of Defense (Comptroller) to correct the situation. As a result, we limited our review to management controls over the functional and physical configuration audit process at the REACT Program Office and the DCMO. The DCMO provides contract administration responsibilities for the REACT Program and is a field organization of the DCMAO.

Adequacy of Management Controls. At the REACT Program Office and the DCMO, we did not identify any material management control weakness applicable to our primary audit objective.

Program Office. The REACT Program Office conducted semiannual self-inspections in accordance with the Ballistic Missile Organization Regulation 123-1, "BMO [Ballistic Missile Organization] Self-Inspection Program," December 19, 1991. The Regulation did not require the Program Office to make vulnerability assessments of each functional or program area. However,

the Program Office did conduct self-inspections in accordance with the Regulation that covered, in part, the configuration management process. In October 1995, the REACT Program Office moved to the Silo-Based Intercontinental Ballistic Missile System Program Office, Hill Air Force Base, Utah. After that move, the REACT Program Office was covered under the System Program Office's vulnerability assessments and Management Control Program.

Defense Contract Management Office. The DCMO, Colorado Springs, was covered under management control reviews conducted by the DCMAO, Denver. The DCMAO conducted its management control reviews based on assessable units specified in the Defense Logistics Agency Management Control Plan for FYs 1993 through 1997.

Prior Audit Coverage

During the last 5 years, the General Accounting Office; the Office of the Inspector General, DoD; and the Air Force Audit Agency have not issued reports on the REACT Program addressing functional and physical configuration audit issues.

Appendix B. Definitions of Technical Terms

Action Item. A document requiring correction of a deficiency in the functional characteristics or technical documentation associated with a configuration item resulting from a functional or physical configuration audit.

Allocated Baseline. The initially approved documentation describing a configuration item's functional and interface characteristics that are allocated from those of a higher level of configuration item. The allocated baseline consists of the development specifications that define functional requirements for each configuration item. The program office normally establishes the allocated baseline at the preliminary design review, but no later than the critical design review.

Configuration Control Board. A Government or contractor board composed of technical and administrative representatives who recommend approval or disapproval of proposed engineering changes to a configuration item's current approved configuration documentation. The board also recommends approval or disapproval of proposed waivers and deviations from a configuration item's current approved configuration documentation.

Configuration Identification. The process of establishing and describing the contractual baselines and related configuration items.

Configuration Item. An aggregation of hardware, firmware, or computer software or any of their discrete portions that satisfies an end use function and is designated by the Government for separate configuration management.

Configuration Management. Technical and administrative direction and surveillance actions taken to identify and document functional and physical characteristics of an item, to control changes to a item and its characteristics, and to record and report change processing and implementation status.

Configuration Management Plan. A document defining how configuration management will be implemented, including policies and procedures, for a particular acquisition or program.

Critical Design Review. A review conducted to:

o determine that the detailed design satisfies performance and engineering requirements of the development specification;

o establish the detailed design compatibility requirements of the development specification;

o establish the detailed design compatibility among the item and other items of equipment, facilities, computer program, and personnel;

o assess producibility and risk areas; and

- o review the preliminary product specifications.

Deviation. A written authorization, granted before the manufacture of an item, to depart from a particular performance or design requirement of a specification, drawing, or other document for a specific number of units or a specified period.

Engineering Change Proposal. A contractor document describing and justifying a proposed engineering change and applicable costs that is submitted to the Government for approval or disapproval.

Formal Qualification Test. A system level test to verify that the configuration item meets the performance requirements of the system specification.

Functional Configuration Audit. A formal examination of functional characteristics of test data for configuration items to verify that the item has achieved the performance specified in its functional or allocated identification. If the item was developed at Government expense, the functional configuration audit must be performed before acceptance of the item. The functional configuration audit must be performed on a prototype or the configuration to be released for production of the operational quantities.

Interface Control Document. Technical agreements required to successfully develop interoperable configuration items designed independently by technical engineers.

Low-Rate Initial Production. The production of a system in limited quantity to provide articles for operational test and evaluation and to establish an initial production rate sufficient to lead to full-rate production upon successful completion of operational testing.

Physical Configuration Audit. A formal examination to verify that the configuration item "as built" conforms to the technical documentation that defines the item. The physical configuration audit includes a detailed audit of engineering drawings, specifications, technical data, and tests utilized in production of the item. The physical configuration audit may be conducted on the first full-rate production or the first low-rate initial production item. Approval by the Government program office of the product specification and satisfactory completion of the physical configuration audit establishes the product baseline. A contractor is required to process all subsequent changes to the product baseline by the formal engineering change proposal process.

Preliminary Design Review. Review conducted for each configuration item to evaluate the progress, technical adequacy, and risk resolution of the selected design approach; to determine its compatibility with performance and engineering requirements of the development specification; and to establish the existence and compatibility of the physical and functional interfaces among the item and other times of equipment, facilities, computer programs, and personnel. After successful completion of the review, the preliminary design is made into a detailed design.

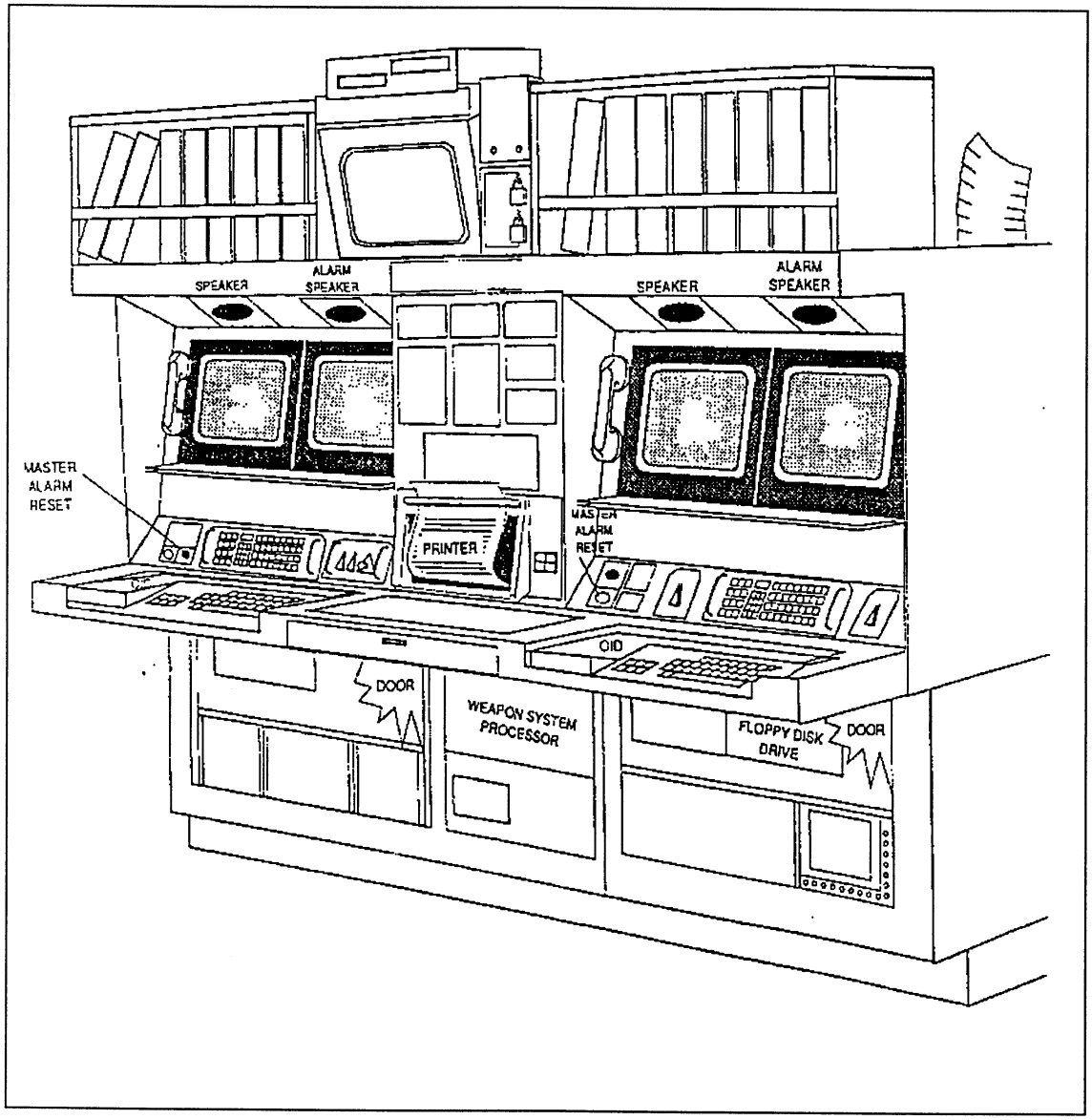
Product Baseline. The baseline established at the physical configuration audit that includes product, process, and material specifications and engineering drawings. Approval of the configuration item product specification by the Government program office and satisfactory completion of the physical configuration audit establish the product baseline.

Prototype. An original or model on which a later item is formed or based.

Specifications. A document intended primarily for use in procurement that clearly and accurately describes the essential technical requirements for items, materials, or services, including the procedures for determining whether the requirements have been met.

Waiver. A written authorization to accept a configuration item that departs from specified requirements. The item may be considered suitable "as is" or after rework by an approved method.

Appendix C. Rapid Execution and Combat Targeting Program Console



Appendix D. Functional and Physical Configuration Audit Guidance

The DoD Instruction 5000.2, "Defense Acquisition Management Policies and Procedures," February 23, 1991, and selected military standards provide guidance concerning functional and physical configuration audits. This guidance is being revised. In June 1994, the Secretary of Defense directed the use of performance and commercial specifications and standards instead of military specifications and standards, unless no practical alternative meets the needs of the user. In response, the Defense Standardization Improvement Council is reviewing what standards should be canceled to comply with the Secretary of Defense guidance. Also, a working group is rewriting DoD Directive 5000.2 to rely more heavily on commercial specifications and may cancel DoD Manual 5000.2M, "Defense Acquisition Management Documentation and Reports," February 23, 1991. Completion of the rewrite is expected during 1996.

DoD Instruction 5000.2

A draft change, October 11, 1995, to DoD Instruction 5000.2 discusses the acquisition management process, program definition, program structure, program design, program assessments and decision reviews, and periodic reporting. The program design section discusses, in part, configuration management. It states that the configuration management process controls the system products, processes, and related documentation and includes:

- identifying, documenting, and verifying the functional and physical characteristics of an item;
- recording the configuration of an item;
- controlling changes to an item and its documentation; and
- providing a complete audit trail of decisions and design modifications.

Military Standards

The following military standards concerning functional and physical configuration audits are applicable to the REACT Program.

o Military Standard 480B, "Configuration Control - Engineering Changes, Deviations and Waivers," establishes the requirement, formats, and procedures to use when preparing configuration control documentation.

o Military Standard 483A, "Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs," establishes uniform configuration management practices, including interface control guidance, to be tailored to specific programs.

o Military Standard 973, "Configuration Management," defines the configuration management requirement applicable to Defense materiel items.

o Military Standard 1521B, "Technical Reviews and Audits for Systems, Equipment, and Computer Resources," establishes guidance for conducting the FCA and PCA.

The Defense Standardization Improvement Council incorporated various configuration management segments of Military Standard 483A and the FCA and PCA segments of Military Standard 1521B into Military Standard 973. The remaining segments of Military Standards 483A and 1521B were subsequently canceled. Military Standard 480B was also replaced by Military Standard 973 in April 1992. The Defense Standardization Improvement Council plans to cancel Military Standard 973 after a non-Government configuration management standard that meets the needs of the Government is implemented.

Appendix E. Waivers and Deviation Reviewed for the Rapid Execution and Combat Targeting Program

Waiver or Deviation Number	Approved	Value (dollars)	Title
LCFRW-001	Yes[1]	0	Weapon System Process
LCPRD-002	Yes[2]	0	Chassis to Ground Installation on Operator Input Device
LCFRW-003	Yes[1]	0	Sell Off EM-8
LCFRW-004	No[3]		Loral withdrew before titling
LCFRW-005	No[3]		Loral withdrew before titling
LCFRW-006	No[3]		Loral withdrew before titling
LCFRW-007	Yes[4]	0	Electroless Nickel Plating
LCFRW-008	No[3]		Use of H900 for 17-4 PH Stainless
LCFRW-009	Yes[5]	150,000	Voice Control Panel EW01 Diode
LCFRW-010	Yes[5]	30,000	Power Control and Distribution Unit Capacitors Bleed-Off
LCFRW-011	Yes[5]	9,000	Console Operating Program Version 3B11.4
LCFRW-012	Yes[5]	150,000	Hard Audio Diode Lead Termination
LCFRW-013	Yes[5]	100,000	Transformer Thermal shock Qualification
Total		**439,000**	

[1]REACT Program Office approved waiver; however, waiver is minor in nature with no apparent value.
[2]REACT Program Office approved deviation; however, waiver is minor in nature with no apparent value.
[3]Loral withdrew and canceled waiver. Consequently, the REACT Program Office did not establish a value for waiver.
[4]REACT Program Office approved waiver; however, it did not request consideration.
[5]REACT Program Office approved waiver and estimated a value.

Appendix F. Summary of Potential Benefits Resulting From Audit

Recommendation Reference	Description of Benefit	Type of Benefit
A.	Program Results. Will ensure that interface control documents used in formal qualification tests are updated with recent changes within the intercontinental ballistic missile environment.	Nonmonetary.
B.1.	Management Controls. Will ensure that evaluations of current waivers and deviation are documented and that associated contracts provide equitable price adjustments or other consideration for granting the waivers and deviation.	Nonmonetary.
B.2.	Management Controls. Will ensure that future waivers and deviations are evaluated, that the evaluations are documented, and that associated contracts provide equitable price adjustments or other consideration for granting the waivers and deviations.	Nonmonetary.

Appendix G. Organizations Visited or Contacted

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition and Technology, Washington, DC
- Principal Deputy Under Secretary of Defense for Acquisition and Technology, Washington, DC
  - Computer-Aided Acquisition and Logistic Support, Alexandria, VA
- Defense Standardization Improvement Council, Alexandria, VA

Department of the Air Force

Air Force Materiel Command, Wright-Patterson Air Force Base, OH
- Silo-Based Intercontinental Ballistic Missile System Program Office, Hill Air Force Base, UT
  - Detachment 10, Development Systems Organization, Hill Air Force Base, UT
    - Rapid Execution and Combat Targeting Program Office, Hill Air Force Base, UT

Assistant Secretary of the Air Force (Acquisition), Washington, DC
Assistant Secretary of the Air Force (Financial Management and Comptroller), Washington, DC
Air Force Space Command, Peterson Air Force Base, CO
Air Force Audit Agency, Wright-Patterson Air Force Base, OH

Other Defense Organizations

Defense Contract Audit Agency, Fort Belvoir, VA
Defense Logistics Agency, Fort Belvoir, VA
- Defense Contract Management Command, Fort Belvoir, VA
  - Defense Contract Management Area Operations, Denver, CO
    - Defense Contract Management Office, Colorado Springs, CO

Contractors

Loral Command and Control Systems, Colorado Springs, CO
TRW, Rapid Execution and Combat Targeting Program, Hill Air Force Base, UT

Appendix H. Report Distribution

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition and Technology
  Director, Defense Logistics Studies Information Exchange
Under Secretary of Defense (Comptroller)
  Deputy Chief Financial Officer
  Deputy Comptroller (Program/Budget)
Assistant to the Secretary of Defense (Public Affairs)

Department of the Army

Auditor General, Department of the Army

Department of the Navy

Auditor General, Department of the Navy

Department of the Air Force

Air Force Materiel Command
  Program Director, Silo-Based Intercontinental Ballistic Missile System Program Office
    Program Manager, Rapid Execution and Combat Targeting Program Office
Assistant Secretary of the Air Force (Acquisition)
Assistant Secretary of the Air Force (Financial Management and Comptroller)
Air Force Space Command, Peterson Air Force Base, CO
Auditor General, Department of the Air Force

Other Defense Organizations

Director, Defense Contract Audit Agency
Director, Defense Logistics Agency
  Defense Contract Management Command
    Defense Contract Management Area Operations, Denver, CO
      Defense Contract Management Office, Colorado, Springs, CO
Director, National Security Agency
  Inspector General, National Security Agency

Non-Defense Federal Organizations and Individuals

Office of Management and Budget
Technical Information Center, National Security and International Affairs Division, General Accounting Office
Chairman and ranking minority member of each of the following congressional committees and subcommittees

- Senate Committee on Appropriations
- Senate Subcommittee on Defense, Committee on Appropriations
- Senate Committee on Armed Services
- Senate Committee on Governmental Affairs
- House Committee on Appropriations
- House Subcommittee on National Security, Committee on Appropriations
- House Committee on Government Reform and Oversight
- House Subcommittee on National Security, International Affairs, and Criminal Justice, Committee on Government Reform and Oversight
- House Committee on National Security

Contractor

Loral Command and Control Systems

Part III - Management Comments

Program Executive Officer, Bombers, Missiles and Trainers, Comments

DEPARTMENT OF THE AIR FORCE
AIR FORCE PROGRAM EXECUTIVE OFFICE
WASHINGTON DC

30 January 1996

MEMORANDUM FOR OFFICE OF THE INSPECTOR GENERAL, DEPARTMENT OF DEFENSE (MR. JOHN DIZK)

FROM: AFPEO/ST
1230 Air Force Pentagon
Washington, DC 20330-1230

SUBJECT: Management Comments, Draft Audit Report, Functional and Physical Configuration Audits of the Air Force Rapid Execution and Combat Targeting Program (Project No. 5AE-0032.01)

Attached are management comments on the above report. Questions concerning this action may be addressed to Mr. Terry Hamblin, Program Control Division, (801) 777-1309.

RICHARD V. REYNOLDS
Brigadier General (S), USAF
Program Executive Officer
Bombers, Missiles and Trainers

Final Report Reference

Comments on a Draft of a Proposed Audit Report, Functional and Physical Configuration Audits of the Air Force Rapid Execution and Combat Targeting Program, Project No. 5AE-0032.01

Finding A, page 4. Concur in Part. 4

Concur with the first two items listed under this finding. However, all interfaces (which are affected by other DoD programs such as communication satellite programs) cannot possibly be frozen for the duration of a major modification. Furthermore, it is impossible to guarantee that the operational users will properly document all local changes to the interfaces (such as changes in the voltages provided by local telephone companies). The most cost-effective means of resolving minor interface definition inaccuracies is to correct them as part of a development or modification program (as opposed to implementing a tremendously expanded, and significantly more expensive, on-going Interface Control Drawing maintenance process). However, it must be noted that it is standard ICBM System Program Office (SPO) practice to identify all affected hardware and software interfaces and update ICDs as necessary prior to initiating any major ICBM system upgrades or modifications. This process, which has been in effect since the inception of the ICBM SPO, is currently being formally documented in LM Business Practice 62-02. The third item listed under this finding is erroneous: the Launch Control Center (LCC) operators do not use ICDs to accomplish their mission.

Recommendation for Finding A, page 7. Concur. 6

As part of the transfer of management processes to OO-ALC/LM, ICD maintenance has been given a higher priority and all changes (when cost effective and/or under our control) will be posted to the appropriate document.

Attachment 1

Final Report Reference

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Finding B, page 8. Concur with Intent.

The overall configuration management processes of the Ballistic Missile Office (now defunct) have been overhauled and replaced by the processes of the ICBM System Program Office (SPO) under the Integrated Weapon System Management concept. The SPOs decision process for each waiver is documented in the Configuration Control Board (CCB) process. In addition, every waiver or deviation request situation, since program management transfer, has been evaluated for consideration (including all supporting documentation) and we will continue to do so in accordance with all applicable directives and guidance.

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Recommendations for Finding B, page 11. Concur.

These recommendations have been implemented on the REACT contracts as of September 1995. The documentation on waivers prior to that date will be completed by 1 May 1996.

Attachment 1

Audit Team Members

The Acquisition Management Directorate, Office of the Assistant Inspector General for Auditing, DoD, prepared this report.

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