DEPARTMENT OF DEFENSE

AUDIT REPORT

ACQUISITION OF THE M9 ARMORED COMBAT EARTHMOVER PROGRAM

No. 90-002 October 6, 1989

* * NOTICE * *

Contractor proprietary information has been deleted from this report.

Office of the Inspector General

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

October 6, 1989

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (FINANCIAL MANAGEMENT)
DIRECTOR, DEFENSE LOGISTICS AGENCY

SUBJECT: Report on the Audit of the Acquisition of the M9 Armored Combat Earthmover Program (Report No. 90-002)

This is our final report on the Audit of the Army's M9 Armored Combat Earthmover (ACE) Program for your information and use. Comments on a draft of this report were considered in preparing this final report. We made the audit from July 1988 through May 1989. The audit's overall objective was to evaluate the acquisition management of M9 ACE regarding critical program management elements. The audit evaluated system requirements, acquisition plans and contract procedures, testing issues, cost-estimating and analysis, vehicle design maturity matters, and logistics considerations. The M9 ACE is a tracked earthmoving vehicle that has the ability to move, survive, and work with the flow of battle. In July 1986, the Army awarded a $222.4 million contract to Bowen McLaughlin-York (BMY) Corporation to produce 566 M9 ACE vehicles. The Army's total program cost is estimated to be $300 million for the development and procurement of 581 vehicles. The Marine Corps is also planning to have the Army procure 257 M9 ACE vehicles from BMY Corporation at a total estimated cost of $130 million.

Many aspects of the Army's M9 ACE program were managed well, and the project office was fully staffed with capable and experienced personnel. Our review of seven program management element objectives did not disclose any major problems. The audit results for these objectives are summarized in Part I of this report. The audit identified needed improvements and internal controls in contract procedures for modifications, warranty provisions, component breakout, technical manuals, and parts standardization. The following paragraphs summarize our findings and recommendations. The findings, recommendations, and management comments are discussed in Part II of this report.

The Army and the Defense Logistics Agency had not ensured that modifications to the M9 ACE production contract were being awarded at fair and reasonable prices. As a result, the Army's contracting officer accepted a contract modification price reduction that was $277,163 less than a fair and reasonable price

reduction, and the Defense Logistics Agency's administrative contracting officer allowed another contract modification to be overstated by $9,075. We recommended that the procuring and administrative contracting officers obtain certified cost or pricing data on modifications that cost $100,000 or more, prepare price negotiation memorandums for modifications negotiated, and pursue proposal analysis and field pricing support as required by the Federal Acquisition Regulation. We also recommended that the procuring and administrative contracting officers seek voluntary contract price reductions from the production contractor (page 9).

The Army had established high-level thresholds for the M9 ACE's warranty deductible. As a result, the Army may incur at least $456,196 for warranty coverage of its 566 M9 ACE vehicles without obtaining any real coverage to ensure against risks, since the probability of reaching the failure thresholds is remote. If the Army contracts for the Marine Corps' 257 vehicles the same way it did for its vehicles, the Government will spend an additional $207,142 without any real warranty coverage. We recommended that the Army Materiel Command revise its warranty policy in Army Regulation 700-139 regarding basic cost-effectiveness considerations, including the use of reliability data for the systems parts and experience from other programs. We recommended that the contracting officer either obtain an appropriate warranty threshold or request a refund for the existing warranty from the M9 ACE contractor. Finally, we recommended that the M9 ACE Project Office perform a cost-effectiveness review as required by Army Regulation 700-139 before contracting for the Marine Corps' vehicle warranty requirement (page 15).

The M9 ACE Project Office did not adequately pursue a detailed component breakout program as required by the Defense Federal Acquisition Regulation Supplement. We estimated that breakout of six selected components from the original equipment manufacturer would save the Government about $8.5 million during the M9 ACE production program. We recommended that the U.S. Army Tank-Automotive Command determine if the six components warrant breakout for the remainder of the program, ascertain whether there are other potential breakout candidates that warrant breakout for the remainder of the program, and establish policies and procedures to comply with component breakout requirements for future acquisitions (page 21).

The Army did not receive accurate, complete, and timely technical manuals for the M9 ACE vehicle from the technical support contractor. Our review disclosed that 68 percent of the 743 tasks in the 3 series of technical manuals had been neither validated nor verified as required by DoD procedures. As a result, adequate manuals may not be available to complete the

Army's training plan and to support the current M9 ACE fielding date of October 1989. We recommended that the project officer reconcile the technical manual tasks to the Logistics Support Analysis Record data base to ensure the M9 ACE manuals are complete and accurate. We also recommended that a plan be developed and executed to perform the verification of all remaining technical manual tasks and that contractor performance be closely monitored to ensure complete and accurate manuals are delivered to the troops (page 29).

The Army did not adequately pursue a material standardization and specification program for the M9 ACE to minimize the system's life cycle support costs. If the Army continues to allow similar parts to remain in the Defense supply system, the Government could unnecessarily spend about $5.4 million for the M9 ACE program. We recommended that the Army accomplish an in-depth engineering screening of M9 ACE parts and fully coordinate the results of the screening with the Defense Logistics Agency's Military Parts Control Advisory Groups, as required by the DoD Parts Control Program. We also recommended that the project manager strengthen procedures to ensure that the contractor adheres to the contract requirements of the DoD Parts Control Program (page 39).

The audit identified an internal control weakness as defined by Public Law 97-255, Office of Management and Budget Circular A-123, and DoD Directive 5010.38. Internal controls were either nonexistent or not effective. Finding C identifies the need for controls to ensure that component breakout options are fully considered and related actions and decisions are adequately supported. Recommendations C.1. and C.2.c. in this report, if implemented, will correct this weakness. We have determined that the monetary benefit that can be realized by implementing Recommendation C.2.a. in this report, which requires the Army to perform a breakout review for the M9 ACE, will be $8.5 million. We could not determine the monetary benefits to be realized by implementing Recommendations C.1. and C.2.c. The monetary benefits were not readily identifiable because implementation of these recommendations will result in the Army breaking out components for future acquisitions whenever it offers the potential for significant benefit to the Government. An additional internal control weakness is discussed in Part I of the report.

On June 30, 1989, a draft of this report was provided to the Assistant Secretary of the Army and the Director, Defense Logistics Agency, for comment. The Army concurred with Recommendations A.1.a., A.2., B.1., B.2.a., B.2.b., B.2.c., B.2.d., C.2.b., C.2.c., and E.2. and proposed or implemented corrective actions that meet the intent of the recommendations. The Defense Logistics Agency concurred with Recommendations A.3.a., A.3.b., and A.4. and proposed or implemented corrective

actions that meet the intent of the recommendations. Management comments are summarized in Part II of this report and are presented in detail in Appendixes I and J. The Army's comments on Recommendation C.2.a. indicated concurrence, but the proposed corrective action does not completely meet the intent of the recommendation, as discussed in Part II of this report. We request that the Army reconsider its position on Recommendation C.2.a. in response to this final report. Also, the Army did not respond to Recommendation C.1. in the report. We request that the Army provide comments indicating concurrence or nonconcurrence with Recommendation C.1. If you concur, describe the corrective actions taken or planned, the completion dates for actions already taken, and the estimated dates for completion of planned actions. If you nonconcur, please state your specific reasons. If appropriate, you may propose alternative methods for accomplishing desired improvements. In addition, we request that the Army provide completion dates for corrective actions taken or proposed for Recommendation E.2. in response to the final report.

The Army nonconcurred with Recommendation A.1.b., which recommended a voluntary contract price reduction of $277,163 in monetary benefits, because it believed that requesting a voluntary refund would be inconsistent with the facts contained in the contract file. Also, the Army nonconcurred with Recommendation D.1. to develop a plan to perform the validation and verification of all remaining technical manual tasks. It stated that there is no direct correlation between Logistics Support Analysis Record tasks and technical manual tasks, and that all 338 maintenance tasks in the manuals were validated and verified. The Army nonconcurred with Recommendation D.2., which addressed the need to ensure that close monitoring of contractor performance is complete and that accurate manuals are delivered to the troops. The Army stated that the proper management structure is in place and appropriate technical manual and logistics in-process reviews have been conducted throughout the term of the contract. Further, the Army nonconcurred with Recommendation E.1. to perform an in-depth engineering screening of the M9 ACE parts and fully coordinate results of the review with Defense Logistics Agency's Military Parts Control Advisory Groups. It stated that screening for standardization is of the greatest benefit when done early in the design of a program and that occurred many years ago for the M9 ACE. We believe that these four recommendations are still valid for reasons discussed in Part II of the report, and therefore request management to reconsider its position on these recommendations in its response to this final report.

Based on management's comments and other information, we revised Finding D. On the basis of the Army's comments, we have deleted Recommendation D.3., which addressed the revision of the

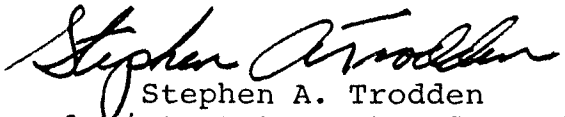
technical support contract to reflect changes in the scope of work, and revised Recommendation D.1. to only require a verification by the actual users of the technical manuals for the remaining manuals not validated under the current technical support contract. Recommendations D.1. and D.2. in the draft report have been renumbered Recommendations D.2. and D.3., respectively, in the final report. We also added a new Recommendation D.1., which addresses the need to reconcile the technical manual tasks to the Logistics Support Analysis Record data base to ensure the M9 ACE manuals are complete and accurate. Therefore, we request that the Army provide comments to Recommendation D.1. in response to the final report. We have also included clarifying information in Finding D.

The Army disagreed with the potential monetary benefits identified in Recommendations A.1.b., C.2.a., and E.1. The Defense Logistics Agency disagreed with the potential monetary benefits in Recommendation A.3.b. We believe that these benefits are valid for reasons discussed in Part II of the report; therefore, we ask that management provide final comments on the estimated monetary benefits of $10.6 million described in Appendix K. Potential monetary benefits are subject to resolution in the event of nonconcurrence or failure to comment.

DoD Directive 7650.3 requires that all audit recommendations be resolved within 6 months of the date of the final report. Accordingly, final comments on the unresolved issues in this report should be provided within 60 days of the date of this memorandum.

This report contains data that may be contractor sensitive. Therefore, the report should not be released outside of the Department of Defense.

The courtesies extended to the audit staff are appreciated. Audit team members are listed in Appendix M. If you have any questions on this audit, please contact Mr. John Dillinger on (202) 693-0186 (AUTOVON 223-0186) or Mr. Ronald Mazurik on (202) 693-0007 (AUTOVON 223-0007). Copies of this report are being provided to the activities listed in Appendix N.



Stephen A. Trodden
Assistant Inspector General
for Auditing

Enclosures

cc:
Secretary of the Army

REPORT ON THE AUDIT OF THE ACQUISITION OF THE M9 ARMORED COMBAT EARTHMOVER PROGRAM

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Prepared by:
Acquisition Management
Directorate
Project No. 8MB-0058

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REPORT ON THE AUDIT OF THE ACQUISITION OF THE M9 ARMORED COMBAT EARTHMOVER PROGRAM

PART I - INTRODUCTION

Background

The M9 Armored Combat Earthmover (ACE) is a vehicle that has the ability to move, survive, and work with the flow of battle. The M9 ACE, a highly mobile and tracked vehicle, responds immediately to a commander's need to eliminate enemy obstacles, create obstacles to hinder enemy maneuvers, prepare fighting positions for the fighting forces, and maintain roads and supply routes. The M9 ACE has the ability to bulldoze, grade, excavate, haul, and swim in a hostile environment. The M9 ACE can self-load its 8-cubic-yard scraper bowl with earth or palletized cargo and then self-eject the load. The operational requirements of the M9 ACE are:

- Air transportable by C-130, C-141, and C-5A aircraft;

- Capable of speeds of up to 30 miles per hour on normal, dry, and level terrain;

- Capable of negotiating slopes with grades of up to 60 percent and operating horizontally on grades of up to 40 percent;

- Capable of being operated by one person; and

- Capable of fording streams up to 60 inches deep and swimming 3 miles per hour in calm water with the installation of an amphibious kit.

The system's operating range (unballasted) is 200 miles over secondary roads and rolling terrain. The M9 ACE provides light armor and chemical protection for the operator and light armor protection to the engine, power train, and other key components. The M9 ACE also has a gas particulate filter unit that can be used in nuclear, biological, and chemical (NBC) environments. The M9 ACE has an M259 smoke grenade launcher that makes it capable of producing a smoke screen, which enhances forward area survivability. The M9 ACE can operate at night or with the hatch closed through the use of installed vision devices.

The M9 ACE program began in 1956, and the U.S. Army Belvoir Research and Development Center was responsible for the early development of the M9 ACE program. In January 1982, the Army transferred the responsibility for the M9 ACE's system

development to the U.S. Army Tank-Automotive Command (TACOM). TACOM awarded a low-rate initial production contract (firm-fixed-price) for 15 vehicles to Pacific Car and Foundry Company (PACCAR) of Renton, Washington, in November 1982.

In September 1985, the Army System Acquisition Review Council approved the acquisition of 566 M9 ACE vehicles. This follow-on procurement was fully competitive and resulted in a fixed-price (economic price adjustment) award to Bowen McLaughlin-York (BMY) Corporation of York, Pennsylvania, in July 1986. The basic contract required BMY Corporation to deliver 22 vehicles in fiscal year 1988, and it had priced options for an additional 544 vehicles through fiscal year 1991. The contract with BMY Corporation was awarded for 566 vehicles valued at $222.4 million. As of February 27, 1989, the Army had exercised options on the contract for 302 vehicles, valued at $127.1 million. In July 1986, TACOM awarded a firm-fixed-price contract to BMY Corporation for spare parts valued at $7.6 million. Also, TACOM used a separate competitive procurement process to select a contractor for technical support services. In March 1987, a technical support services contract was awarded to the AM General Corporation of the LTV Aerospace and Defense Company. The contract value was $10 million as of April 12, 1989.

The M9 ACE Project Office manages the M9 ACE program. The project manager has operated under the direction of the Program Executive Officer, Heavy Force Modernization, for issues related to the program. As of July 1, 1989, these responsibilities were transferred to TACOM. The Army's current program costs are estimated at about $300 million for 581 vehicles. The estimated program costs for the Marine Corps are about $130 million for 257 vehicles.

Objectives and Scope

The overall audit objective was to evaluate the acquisition management of the M9 ACE. We made the audit in accordance with our critical program management elements approach. We focused our evaluation on 10 elements of program management critical to the early production and deployment phase of the M9 ACE system acquisition, which included reviewing:

- threat compared to system requirements,
- adherence to the acquisition plans,
- follow-on test and evaluation plans and procedures,
- open test issues,

- contract procedures,
- component breakout and second source decisions,
- vehicle design maturity,
- cost-estimating and analysis,
- logistics support, and
- turnover from contractor to organization support.

Based on the results of our audit survey conducted from July 1988 through November 1988, we determined that additional audit work was warranted to assess the Army's and the Marine Corps' M9 ACE requirements, to evaluate expanded comparison production tests and the program's ability to resolve open-test issues, to evaluate warranty provisions for cost-effectiveness and compliance with cognizant regulations, and to determine the adequacy of component breakout efforts. We also evaluated the effectiveness of configuration management and other procedures for evaluating and validating contractor technical data packages, the adequacy of the contract modifications for cost reasonableness and compliance with the Federal Acquisition Regulation, the adequacy of the program's technical manuals, and the adequacy of the program's standardization of provisioned vehicle parts.

This economy and efficiency audit was conducted from July 1988 to May 1989 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 obtained and reviewed data and information primarily from January 1982 through May 1989 to support the audit. We interviewed personnel involved in the acquisition of the M9 ACE system and other cognizant personnel. Technical assistance was provided in the audit of test issues, technical data package, and parts standardization by our Technical Support Group. A list of activities visited or contacted is in Appendix L.

During the audit survey, we determined that additional audit work was not warranted in the areas of the threat compared to system requirements, adherence to the acquisition plans, cost-estimating and analysis, and turnover from contractor to organization support. Areas included in the audit verification phase that did not result in significant reportable conditions were assessing the Army's and the Marine Corps' M9 ACE requirements, evaluating expanded comparison production tests and the program's ability to resolve open-test issues, and evaluating the effectiveness of configuration management and other procedures for evaluating and validating contractor technical data packages. In these areas, we did not observe any significant problems or, at the time of

our audit, Army management was implementing corrective action to resolve these problems. A discussion of these areas follows.

Comparing Threat to System Requirements. We found that the current system requirements set forth in the Qualitative Material Requirements document adequately met the current identified threat. Since June 1977, the Army has been performing an efficiency analysis on a continuing basis to ensure that the system requirements address the threat.

Adherence to the Acquisition Plans. TACOM adhered to its acquisition plans for the M9 ACE production, spare parts, and technical support contracts. The production and spare parts plan listed nine potential manufacturing sources that had expressed an interest in the M9 ACE program with a background in tracked tactical vehicles or earthmoving equipment. The TACOM plan called for a competitive one-step solicitation process and firm-fixed-price contracts. Both the vehicle production (DAAE07-86-C-R100) and spare parts (DAAE07-86-C-R101) contracts were awarded to BMY Corporation, and the Army generally adhered to the milestones set forth in the plan. In addition, TACOM awarded the technical support contract using fully competitive acquisition methods as recommended by the plan. The acquisition plan for satisfying the new Marine Corps M9 ACE requirements was not completed by the end of our audit.

Cost-estimating and Analysis. We found that the cost estimate and price analysis for the M9 ACE main production contract for 566 vehicles generally complied with the Federal Acquisition Regulation and related DoD regulations, except for contract modifications (Finding A). The Army prepared an independent cost estimate and compared it to the six responsive bids. Also, TACOM performed adequate price analyses on contractors' bids and awarded the production and spare parts contracts on July 25, 1986, to BMY Corporation. We also found that the technical support contract (DAAE07-87-C-R031) awarded to AM General Corporation was made at a fair and reasonable price. TACOM performed both a technical and a price analysis assessment of all six responsive bidders before awarding this fixed-price incentive contract.

Turnover from the Contractor to Organization Support. We did not identify any problems in this program management area. The turnover from contractor to organization support was not a significant factor in the M9 ACE program because the Army did not rely on the contractor for organization support.

Vehicle Requirements for the U.S. Army and U.S. Marine Corps. We found that the Army's requirement for a total of 580 vehicles was generally reasonable and did not represent all Army requirements for M9 ACE's. The Army planned to use the

M9 ACE vehicle in light infantry divisions when vehicle requirements may be served best by equipment, such as the new prototype tractor with solid rubber track treads, which is currently being developed by the Marine Corps. Our discussions with management at the Directorate of Combat Development, U.S. Army Engineer School, indicated that the Army recognized that the use of the M9 ACE in light infantry divisions was less than desirable, but the Army's management believed that there was no better alternative at that time. The Army planned to reevaluate the use of the M9 ACE in the light infantry division after the Marine Corps completed its development effort. In addition, we found that the Marine Corps' requirement for 257 M9 ACE vehicles for its armored divisions was adequately supported.

Open Test Issues. The Army was still trying to achieve first article acceptance of the M9 ACE when the draft of this report was being prepared. This testing was initially conducted from June 1988 through August 1988 at the Aberdeen Proving Ground with a test series known as initial production tests (IPT). During the IPT, the M9 ACE system scored low in the hardware reliability and maintainability requirements areas, which are specified in the Qualitative Materiel Requirements (QMR) document dated June 3, 1977. Seven major types of hardware failures affecting the brake and suspension systems caused the M9 ACE system not to meet the critical requirement of 45 mean-time hours between each mission failure. The M9 ACE was able to achieve a mean time of only 39.5 hours between mission failures. Based on an assessment of planned engineering change fixes, the Army increased the failure ratio to a mean time of 80.1 hours between failures. The QMR document required an overall maintenance ratio of 0.45 maintenance labor-hour per hour of operation. During IPT testing, the maintenance labor-hour per hour of operation reached 0.50 labor-hours. The Army estimated that it will be able to achieve maintenance labor-hours of 0.32 if planned engineering changes are successfully implemented.

On October 19, 1988, we advised the Army's project manager and the Deputy Under Secretary of the Army (Operations Research) that the M9 ACE system had not been tested for required external electromagnetic interference, nuclear electromagnetic pulse, nuclear blast effects, and extreme cold weather operations. The Deputy Under Secretary of the Army (Operations Research) directed the project manager to report to that office on the untested areas recommended by the DoD Inspector General. The Deputy Under Secretary also approved the decision for an expanded comparison production test, which would test those engineering change fixes for the seven problems encountered during the 1988 IPT. The Director, Operational Test and Evaluation, granted the M9 ACE system release for full-rate production and limited fielding to the Army's engineer school, contingent upon the Army successfully completing the planned expanded comparison production tests.

This test was completed in July 1989, but no final decision concerning fielding had been made at the time of this report.

The Army's program manager had the M9 ACE system tested for external electromagnetic interference and nuclear electromagnetic pulse. Initially, in February 1989, the M9 ACE system passed the nuclear electromagnetic pulse portion of the tests, but failed the external electromagnetic interference portion of these tests at the Army's White Sands Missile Test Range. At the time of our audit, the Army was preparing the formal test report. TACOM stated that it would evaluate the report when published and take any necessary action. The Army had tested the M9 ACE for nuclear blast resistance in June 1989. However, the test results were not available at the time this draft report was issued. Finally, the Directorate of Combat Development, U.S. Army Engineer's Center at Fort Leonard Wood, Missouri, was evaluating the need for fielding M9 ACE's in extreme cold weather regions and was not planning any further testing of this requirement. According to the Engineering Center management, the Army's D-7 bulldozer can perform required functions in extreme cold weather regions instead of the M9 ACE.

At the end of May 1989, the ongoing expanded comparison production tests were being conducted at the Aberdeen Proving Ground. Two steering bolts and two brake chamber brackets on the M9 ACE did not meet reliability requirements. These failures were two of the seven major failures that occurred during earlier initial production testing of the M9 ACE. To correct these deficiencies, the Army initiated engineering changes and related test plans. A preliminary engineering analysis of six other failures (such as final drive, sprockets, and road arms) indicated that they were caused by poor quality components supplied by BMY Corporation's subcontractors. The M9 ACE Project Manager was assessing the various hardware failures experienced during the expanded comparison test to determine the appropriate engineering changes.

Configuration Management and Technical Data Package. Our review did not indicate that deficiencies in the Army's M9 ACE technical data package (TDP) would preclude a practical, experienced, and competent manufacturer from producing the system. During the audit, we reviewed the configuration management and the general adequacy of the TDP that the Army furnished to BMY Corporation for production of the M9 ACE system. We focused the audit on contractor preproduction evaluation changes to the TDP. The sample selection was aimed at areas of the TDP that, according to contractor management personnel, contained the greatest number and most significant problem drawings. In addition to reviewing this sample, we performed other reviews to ensure that other areas of the TDP were generally in good condition. At the suggestion of the Army

Materiel Command's management representative, a team reviewed a sample of preproduction engineering change proposals. The team members included representatives from the Army Materiel Command, TACOM, M9 ACE Project Office, Defense Logistics Agency, and DoD's Office of the Inspector General. This team reviewed 58 of 443 total preproduction engineering change proposals involving 417 drawings (M9 ACE system has about 2,200 drawings). The majority of contractor-requested changes to the TDP were minor in nature to facilitate the production of the M9 ACE. Discussions with Army and BMY Corporation management personnel revealed that the M9 ACE TDP was at least as good as the three other packages currently being used by this contractor to build Army systems.

Internal Controls. During the audit, we identified internal control weaknesses in contractor billings for technical support services on contract no. DAAE07-87-C-R031. We found that the M9 ACE Project Office did not establish internal controls to ensure that contractor submitted billings accurately and fairly represented work completed by the contractor as required by Federal Acquisition Regulation, subpart 42.302. Although our review did not disclose any significant problems from the lack of these controls, the M9 ACE Project Office agreed that corrective action was necessary and took steps to increase its monitoring of contractor performance. Specifically, the project office performed a comprehensive reconciliation of all contractor billings to the contractor performance cost reports. The minor discrepancies that were noted by the M9 ACE Project Office were corrected. The M9 ACE Project Manager has implemented procedures to verify each future contractor billing to ensure that work was actually performed before payment.

Prior Audit Coverage

Neither the DoD Inspector General's office nor the General Accounting Office has made any audits on the M9 ACE in the past 5 years.

PART II - FINDINGS AND RECOMMENDATIONS

A. Contract Modifications

FINDING

The Army and the Defense Logistics Agency (DLA) contracting officers had not ensured that modifications to the M9 Armored Combat Earthmover (ACE) production contract were being awarded at fair and reasonable prices. For the three contract modifications we audited, the contracting officers did not obtain certified cost and pricing data as required by the Federal Acquisition Regulation (FAR). They also did not perform adequate cost reviews on two of the three modifications. As a result, the contract price reduction for deleting the roadwheels from the contract (modification P00004) was $277,163 less than a fair and reasonable price reduction, and a contract price increase for changing muffler parts (modification A00009) was overstated by $9,075.

DISCUSSION OF DETAILS

Background. In February 1987, the Tank-Automotive Command (TACOM) procuring contracting officer (PCO) issued a contract modification deleting the roadwheels from the production contract. During 1988, the PCO delegated authority to DLA's administrative contracting officer (ACO) to negotiate all production contract modifications regarding engineering change proposals and value engineering change proposals with Bowen McLaughlin-York (BMY) Corporation. As of March 1989, we audited three priced contract modifications exceeding $100,000, which were awarded to BMY Corporation for the M9 ACE production contract as shown below.

Contract Modification Number	Date Definitized	Negotiated Contract Adjustment	Purpose of Modification
P00004 1/	February 28, 1987	$3,279,542	Roadwheels (component breakout)
A00007 1/	February 2, 1989	726,367	Value Engineering Changes
A00009	February 27, 1989	373,272	Engineering Changes
Total		$4,379,181	

1/ Contract modifications P00004 and A00007 were reductions to the contract price.

Further, six additional proposed contract modifications with an estimated value of $2.8 million were being negotiated between the ACO and BMY Corporation to incorporate engineering changes into the production contract.

The FAR 15.804 states that certified cost or pricing data be obtained from the contractor when the modification of any contract is expected to exceed $100,000, whether or not cost or pricing data were initially required. Also, FAR 15.805 states that in the cost analysis of the contractor's proposal, the contracting officer is to use the data that were available to the contractor and is responsible for ensuring that the overall price offered is fair and reasonable. From August 18, 1986, to June 4, 1987, the Department of Defense Supplement to the FAR (DFARS) 215.805-5 stated that contracting officers are to request field pricing support for contracts and modifications resulting from proposals exceeding $100,000 for firm-fixed-price contracts, $250,000 for fixed-price incentive contracts, and $500,000 for cost-type contracts. On June 4, 1987, a change to the DFARS increased the amounts to $500,000 for firm-fixed-price and fixed-price incentive contracts and $1 million for cost-type contracts.

Results of Audit. The contracting officers did not achieve a fair and reasonable price on modifications P00004 and A00009. This occurred because the contracting officers did not require certified cost or pricing data and did not perform adequate cost analyses of these modifications as required by FAR 15.804 and 15.805. In addition, the contracting officers did not prepare or maintain an adequate price negotiation memorandum as required by FAR 15.808.

Price Reasonableness. Even though the ACO did not obtain certified cost or pricing data, contract modification A00007 for value engineering changes of the M9 ACE castings was awarded at a fair and reasonable price. However, contract modifications P00004 and A00009 were not awarded for a fair and reasonable price as discussed below.

Contract Modification P00004. The Army's October 1, 1986, letter to BMY Corporation requested information, including a vendor price quotation, for negotiating a price reduction to the production contract for eliminating roadwheels from the contract. On October 15, 1986, BMY Corporation submitted a proposal for * , which was based on a subcontractor's (JAY-EM Corporation) quote, dated September 26, 1986. The PCO relied on uncertified data, instead of obtaining certified cost and pricing data as required by FAR 15.804 for this contract modification. Also, the PCO did not request field pricing support as required by DFARS 215.805-5. We obtained the original cost and pricing data, dated July 8, 1986, used to support the basic production contract, which was awarded on July 25, 1986. BMY Corporation offered to clarify these cost and

*Contractor Data Deleted

pricing data to TACOM at the time of the basic production contract award, but TACOM did not request the data because the award was made on a competitive basis. We found that the contractor applied an escalation factor to the basic roadwheel costs in later production years. The PCO did not apply these same escalation factors in computing the price reduction for the roadwheels. As a result, the PCO accepted a price reduction of $277,163 less than was appropriate (see Appendix A).

Contract Modification A00009. On March 31, 1988, BMY Corporation submitted a net cost proposal of * for an approved engineering change to modify the muffler part. The muffler part was a portion of a total net proposal of * (gross absolute value was $373,272, which is the total value of engineering changes without considering whether they are increases or decreases) for multiple engineering changes. As late as January 1989, the ACO reviewed the cost proposal, which included an old quote (dated May 8, 1987) from * depending on quantity, for the muffler part. On February 27, 1989, the ACO awarded contract modification A00009 to BMY Corporation for a $34,619 negotiated contract adjustment, of which $3,126 was for the engineering change to modify the muffler part. The ACO did not obtain certified cost and pricing data to ensure that the contractor provided current, complete, and accurate cost and pricing data. Further, the Defense Contract Audit Agency issued Report Number 6291-8C240001-9-21, "Audit Report on Estimating System Survey," October 28, 1988, that stated BMY Corporation's estimating policies and procedures were too vague and obsolete to serve as a useful tool in the estimating process. We requested the latest vendor quotes for the muffler part from BMY Corporation and were provided a May 8, 1987, subcontractor quote ranging from * , depending on the quantity purchased. Through the auditor's direct contact with the subcontractor, we found that a later quote had been in effect since August 1987 for * , depending on the quantity purchased. This quote was effective before the Government and BMY Corporation negotiated modification A00009. As a result of not using this later, lower quote, the contractor overcharged the Government by * . (This includes the applicable overhead costs and profit added to the differences in the material quotes for the remaining options for * vehicles.) This overcharge would result in a price reduction of * rather than a contract price increase of * for the engineering change to modify the muffler part. When we told the ACO about this situation, the ACO agreed to review contract modification A00009 and to seek possibly a lower price for the muffler parts.

Price Negotiation Memorandums. FAR 15.808 requires that a price negotiation memorandum be prepared at the conclusion of each negotiation of an initial or revised price. Also, the

*Contractor Data Deleted

contracting officer is to prepare promptly a memorandum of the principal elements of the price negotiation and include the memorandum in the contract file. The PCO was unable to locate the price negotiation memorandum for contract modification P00004, but the PCO claimed that the memorandum had been prepared. In addition, we found that the price negotiation memorandums for contract modifications A00007 and A00009 were inadequate. The ACO gave us handwritten comments on prenegotiation memorandums and working papers as the price negotiation memorandums. However, the ACO did not summarize the results of negotiations and did not include all of the required information, such as the contractor and Government negotiators, the current status of the contractor's purchasing system, and the rationale for not requiring certified cost or pricing data.

RECOMMENDATIONS FOR CORRECTIVE ACTION

1. We recommend that the Commander, U.S. Army Tank-Automotive Command, direct the contracting officer for the M9 Armored Combat Earthmover to:

a. Obtain certified cost and pricing data on all contract modifications valued at $100,000 or more and prepare price negotiation memorandums as set forth in Federal Acquisition Regulation 15.804 and 15.808.

b. Seek a voluntary reduction of $277,163 from Bowen McLaughlin-York Corporation for modification P00004 of contract number DAAE07-86-C-R100.

2. We recommend that the Commander, U.S. Army Tank-Automotive Command reemphasize formally to contracting officers the need to fully pursue all of the proposal analysis and field pricing support requirements of Federal Acquisition Regulation 15.805 and Defense Federal Acquisition Regulation Supplement 215.805-5, respectively.

3. We recommend that the Director, Defense Logistics Agency, direct the administrative contracting officer at the Defense Contract Administration Services Management Area, Reading, Bowen McLaughlin-York Corporation Residence Office, to:

a. Obtain certified cost and pricing data on all contract modifications valued at $100,000 or more and prepare price negotiation memorandums as set forth in Federal Acquisition Regulation 15.804 and 15.808.

b. Obtain a voluntary reduction of $9,075 from Bowen McLaughlin-York Corporation for modification A00009 of contract number DAAE07-86-C-R100.

4. We recommend that the Director, Defense Logistics Agency, reemphasize formally to the administrative contracting officers at the Defense Contract Administration Services Management Area, Reading, the need to fully pursue all of the proposal analysis requirements of Federal Acquisition Regulation 15.805.

MANAGEMENT COMMENTS

The Army concurred with Recommendation A.1.a. and will issue a Procurement Feedback letter by October 15, 1989, calling attention to the FAR requirement for certified cost or pricing data and preparation of price negotiation memorandums. The Army nonconcurred with Recommendation A.1.b. and associated potential monetary benefits to seek a voluntary reduction of $277,163 from the contractor. The Army stated that escalation factors were used in computing its negotiation position for the roadwheel contract price reduction and that requesting a voluntary reduction would be inconsistent with the facts contained in the contract file. The Army concurred with Recommendation A.2. and stated that by October 15, 1989, it will issue a Procurement Feedback Letter calling attention to the recommended FAR and DFARS requirements for proposal analysis and field pricing support. The complete text of management's comments is in Appendix I.

The Defense Logistics Agency concurred with Recommendations A.3.a. and A.4. and on August 22, 1989, issued letters to all administrative contracting officers to familiarize themselves with the requirements of FAR 15.804, 15.805, and 15.808. The Defense Logistics Agency concurred with Recommendation A.3.b. that modification A00009 was overstated, but nonconcurred with the voluntary reduction amount of $9,075. The Agency agreed to negotiate with BMY Corporation to obtain a voluntary refund in the amount of $3,657.70. This reduction was based on the prices that were in effect at the time material orders were placed and using the time phasing of purchases. The full text of management's comments is in Appendix J.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

The Army stated that information in the contract file does not support a price reduction for contract modification P00004. We agree that the PCO requested BMY Corporation to furnish additional pricing data since what it originally submitted was considered insufficient. BMY Corporation furnished these cost back-up data, but the Army did not ask the contractor to certify the cost and pricing data. Also, the Army did not request explanations of cost methodology associated with the cost data, nor did BMY Corporation voluntarily provide its cost methodology concerning the roadwheels as priced in the original best and final offer on the original production contract.

We agree that the Army PCO used escalation factors in computing the Government's negotiation position for the roadwheel contract price reduction. However, the Army's escalation method was not the same as the method used by BMY Corporation to develop its original price for the basic production contract, which was awarded on July 25, 1986. The Army used an escalation technique that computed the percent of change between contract line items and applied this escalation factor to the subcontractor quote of * per roadwheel for each contract line item to arrive at the Army's negotiation goal. We used the same technique for pricing the roadwheel reduction that BMY Corporation used to support the basic production contract. This technique called for the base subcontractor quote of * per roadwheel to be escalated for the later option contract line item roadwheel cost by the price escalation factors set forth in the *
* . We then applied the same decrementing factors *
* for each contract line item used by BMY Corporation to arrive at its best and final offer. The resulting costs per Army PCO and per audit are shown in Appendix A and reflect that the Army negotiated a contract reduction of $277,163 less than appropriate. Since our methods of computation were based upon the same technique and percentage factors originally used by BMY Corporation during its best and final offer for the original production contract, we continue to feel that Recommendation A.1.b. and the associated potential monetary benefits have merit. We request that the Army reconsider its response to Recommendation A.1.b. and the associated potential monetary benefits and provide additional comments in response to the final report.

We still believe that the voluntary reduction of $9,075 from BMY Corporation for modification A00009 is appropriate. On September 6, 1989, the ACO informed us that a $3,657.70 reduction for modification A00009 actually represented all $4,135 recommended by us for the muffler parts and only included three of the five option contract line items recommended by us. We disagree with the approach not to seek a voluntary reduction for the final two contract line items of $4,940. Our computation was based on BMY Corporation's making phased or incremental buys of the muffler parts. Also, the production contract includes an economic price adjustment provision for each option line item. After discussing these points with the ACO, the ACO agreed to initiate negotiations with BMY Corporation and seek a price reduction for the muffler parts in the final two options. We request that DLA provide the results of negotiations in its response to the final report.

*Contractor Data Deleted

B. Warranty

FINDING

The Army has established the M9 ACE's warranty deductible thresholds at high levels, which lessens the opportunity for the Army to recover costs against the warranty. This situation occurred because the Army did not perform a cost review and analysis of the contractor's proposed warranty price of $806 per vehicle as required by Army Regulation 700-139, "Army Warranty Program Concepts and Policies," April 10, 1986, before awarding the contract. After the contract was awarded, the M9 ACE Project Office used inadequate information and data to support the contract's estimated warranty deductible threshold. Also, the Army did not use similar experience from 11 other Tank-Automotive Command (TACOM) systems. In addition, the contractor had not given conveyance warranties for subcontractors' parts and components to the Army as required by the M9 ACE production contract. As a result, the Army may incur at least $456,196 for warranty coverage on its 566 M9 ACE vehicles without obtaining any real coverage to ensure against risks, since the probability of reaching the failure thresholds is remote. If the Army contracts for a warranty for the Marine Corps' 257 M9 ACE vehicles on the same basis, the Government may spend an additional $207,142 without any real warranty coverage.

DISCUSSION OF DETAILS

Background. The 1984 DoD Appropriations Act, section 794, required written warranty coverage on all weapon systems. New warranty legislation, effective January 1985 (United States Code, title 10, section 2403), revised the requirements of section 794. The Army's policy incorporating the new warranty requirements was issued in Army Regulation 700-139. This regulation (Chapter 4, section II 4-3.a.) states that before contracting for a warranty, a cost-effectiveness analysis is required to determine the value of potential benefits received in comparison to the contract cost of the warranty, plus the Army's cost of administration and execution.

On July 25, 1986, the Army procured the M9 ACE's warranty as part of the basic production contract (DAAE07-86-C-R100) at a unit cost of $806 per vehicle for 566 vehicles, or a total cost of $456,196. The Army purchased an expected failure warranty for the M9 ACE vehicle, which means that a specific number of failures (threshold) must occur within a stated time before the contractor is required to reimburse the Army for the costs to fix a failure. Army Regulation 700-139 (Chapter 4, section I 4-2.a.) states that the use of the expected failure concept requires the Army and the supplier to have confidence that the reliability

factors will yield a given quantity of failures during the warranty period. Failures above these threshold levels are intended to be covered by the warranty.

The M9 ACE's warranty was based on an expected failure rate for the basic contract and each of the six options. For example, the warranty for the basic contract (22 vehicles) allowed a total of 100 allowable defects during an 18-month period [2/] before the expected failure threshold would be breached and warranty coverage would go into effect to allow cost recovery by the Army. Specific thresholds for the basic contract and each contract option are outlined in Appendix B. After the threshold has been breached, the warranty covers repairing and replacing defective parts at the organizational maintenance level. The prime contractor reimburses the Army for the costs of associated material and labor. The cost of the warranty in the M9 ACE production contract is only for the contractor's administrative burden.

Warranty Cost-Effectiveness Study. The warranty cost-effectiveness study was not done before the award of the M9 ACE production contract, as required by Army Regulation 700-139. However, the project office performed a limited study to address warranty cost-effectiveness about 4 months after the production contract was awarded. Our review of this limited study indicated that the M9 ACE's reliability data covered 15 parts (9 of 15 parts were based only on estimates) that the project office considered critical depot level repair items. These 15 parts were selected from the 4,204 total parts for the M9 ACE system. These 15 parts were used to calculate the expected part failure rates for the M9 ACE. We were unable to verify part failure rates for any of these parts to supporting documentation. Further, the M9 ACE Project Office did not provide detailed support for figures that were included in the warranty cost model, and it did not provide adequate records to support the reasonableness of its total defect calculation. We did not find any other studies or analyses from either the contractor or the Army that would support the basis for the warranty deductible thresholds. As a result, the Army was unable to support the cost-effectiveness of the M9 ACE warranty.

Warranty Threshold Experience. TACOM's Maintenance Office tracked contract warranty data, such as warranty costs, number of claims submitted, and amount reimbursed by contractors. Since 1979, TACOM had established 11 similar threshold-type warranties for other systems or major system components; 2 of these warranties were with the same contractor as the M9 ACE. Although the Army submitted claims to contractors, none of the

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[2/] The warranty covers an 18-month period starting from the date the Government accepted the vehicle.

11 contract warranty thresholds had been breached to allow for recovery under these warranties. Like the M9 ACE warranty, 6 of the 11 system warranties were priced separately in their respective contracts. The total value of these six contract warranties was $15.2 million. A discussion with TACOM and M9 ACE Project Office management personnel disclosed that the warranty experience of these 11 systems was not considered when making a decision on the M9 ACE system warranty.

Proposal Warranty Cost Basis. The Army procured the M9 ACE's warranty as part of the basic production contract (DAAE07-86-C-R100). The contract was awarded under the competitive sections of the Federal Acquisition Regulation. The initial bid proposal reflected a warranty cost of * per vehicle. The contractor calculated the cost of * based on an estimate of the number of personnel that would be dedicated to warranty administration for the M9 ACE vehicle. The prime contractor reduced the warranty price on the best and final offer from * . *

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BMY Corporation management personnel stated that because some basic or minimal level of labor costs would always be applied to the M9 ACE, *

* . Even though the award was made in a competitive environment, the contractor did offer, but did not provide, detailed price data to TACOM.

Proposed Warranty Guidance. During our audit, the Army Materiel Command appeared to recognize the problem of being unable to obtain cost-effective warranties. We discussed warranty problems with both the Army Materiel Command (March 1989) and the TACOM (September 1988) warranty management personnel. They stated that structuring cost-effective warranties has been recognized as a problem. They also stated that several audit reports cited problems with the Army warranties regarding cost-effectiveness and the validity of warranty data collected. A large portion of the problem was the reliability of the warranty data received. The Army units in the field were reluctant to fill out and submit the required information for warranty claims. In some cases, warranty claims were submitted, but they did not contain reliable information. For example, this problem was noted in DoD Inspector General Audit Report No. 89-042, "Acquisition of the Army's 5-Ton Truck," December 23, 1988. Based on the Army's experiences with warranties over the past 5 years and recommendations in prior audit reports on the subject, the Army Materiel Command has initiated action to revise Army Regulation 700-139 to include more complete details of warranty concepts and to develop a way to obtain contract warranty data through existing Army automated systems.

*Contractor Data Deleted

Conveyance Warranties. The production contract (DAAE07-86-C-R100) provides that warranties offered by subcontractors for parts and components to the prime contractor are conveyed to the Government. For example, we found that such conveyance warranties were available on the engine and transmission. However, our audit disclosed that the Army did not make any attempt to obtain a schedule of all parts and components covered by a conveyance warranty. Also, we found that the prime contractor had not provided the Army any conveyance warranty data and the Army had not set forth its conveyance warranty rights in the M9 ACE technical manuals. When we told the prime contractor about the contract clause on conveyance warranty rights, the contractor immediately initiated action to identify all parts and components with conveyance warranty coverage. In May 1989, TACOM's management personnel advised us that they would initiate action to obtain all conveyance warranty data for the M9 ACE from the prime contractor.

Conclusion. The M9 ACE Project Office procured a $456,196 warranty to comply with legal requirements of warranty legislation passed in 1984 and 1985. However, this warranty was not reviewed before the contract was awarded to determine whether the warranty was cost-effective. Further, TACOM had experience with 11 systems with similar warranties (2 of the 11 were BMY Corporation contract warranties), that if analyzed, would have indicated a problem with using this type of threshold warranty. As a result, the Army may not receive any real warranty coverage from its current M9 ACE warranty. Also, the Army was planning to procure 257 more vehicles for the Marine Corps at the end of our audit. If the Army procures the Marine Corps' vehicle warranty in a similar manner, the Government may spend an additional $207,142 without any real warranty coverage.

RECOMMENDATIONS FOR CORRECTIVE ACTIONS

1. We recommend that the Commander, U.S. Army Materiel Command, complete its recently initiated actions to revise Army Regulation 700-139 to clarify policy on warranty issues. This revision should outline basic cost-effectiveness considerations for threshold-type warranties, such as the need to use the best available reliability data for the system's parts or components and to use warranty experience from other programs.

2. We recommend that the Commander, U.S. Army Tank-Automotive Command:

a. Direct the contracting officer either to obtain an appropriate warranty threshold based on a complete and accurate cost-effectiveness study or to request a voluntary refund for the existing warranty from the M9 Armored Combat Earthmover manufacturer.

b. Direct the M9 Armored Combat Earthmover Project Office to perform a cost-effectiveness review as required by Army Regulation 700-139 before contracting for Marine Corps' vehicle warranty requirements.

c. Direct the M9 Armored Combat Earthmover Project Manager to identify all of the Army's conveyance warranty rights under production contract number DAAE07-86-C-R100. After this action is completed, update the M9 Armored Combat Earthmover maintenance manuals to make the conveyance warranty information available to Army maintenance personnel in the field.

d. Require that cost-effectiveness reviews of all contract warranty cost proposals be properly supported with accurate cost information in accordance with Army Regulation 700-139. As part of these reviews, use warranty experience from other programs and use the best available reliability data for the system's parts or components.

MANAGEMENT COMMENTS

The Army concurred with all recommendations and stated that corrective actions would be completed on all warranty recommendations between September 30, 1989, and February 28, 1990.

The Army concurred in principle with the potential savings of up to $456,196 for the Army's current production contract and a potential cost avoidance of up to $207,142 if the Army contracts for Marine Corps vehicles on the same basis. However, exact potential monetary benefits will not be available until the warranty cost-effectiveness study is completed, and a formal commitment is received from the Marine Corps. A complete text of Management's comments is in Appendix I.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

We consider the Army comments fully responsive to the recommendations.

C. Component Breakout

FINDING

The Project Office for the M9 Armored Combat Earthmover (ACE) did not adequately pursue a detailed component breakout program as required by the Defense Federal Acquisition Regulation Supplement (DFARS) 217.7202. Although the project office performed a limited review of the production contract before contract award, only three major items (engine, final drive, and transmission) were reviewed, and they were not broken out because time did not permit breakout before the planned competitive contract award. Further, the limited review was not supplemented by records that showed net cost savings and analysis to support a favorable or unfavorable breakout. We estimated that breakout of six selected components to the original equipment manufacturers would save the Government about $8.5 million during the remaining life of the M9 ACE production program.

DISCUSSION OF DETAILS

Background. Component breakout is the process of the Government acquiring production components directly from a manufacturer and furnishing them to the end-item prime contractor for incorporation in the end-items. "Components" include subsystems, assemblies, subassemblies, and other major elements of an end-item. Component breakout may decrease the cost of a system because the prime contractor's indirect costs and profit are reduced or eliminated. The project manager for the M9 ACE was responsible for determining the feasibility and cost-effectiveness of component breakout for the M9 ACE.

Policy. DoD encourages component breakout whenever substantial net cost savings can be achieved and if such action will not jeopardize the quality, reliability, performance, or timely delivery of the end-item. DFARS 217.7202 states that the desirability of component breakout should be considered regardless of whether the prime contract is based on price competition or inadequate competition. The regulation further states that a component is normally a candidate for breakout if its procurement cost is expected to exceed $1 million for the current year's requirement.

DFARS 217.7202-4 states that any decision regarding whether or not to break out a component must include an assessment of the potential risks of degrading the end-item, such as delayed delivery and reduced reliability of the component; a calculation of estimated net cost savings (i.e., estimated acquisition savings less any offsetting costs); and an analysis of the technical, operational, logistical, and administrative factors involved.

Breakout Planning. The M9 ACE Project Office performed a limited review of component breakout candidates. In March 1986 [3], the project office decided to break out some minor items, such as the AN/VRC-64 radio harness kit and the gas particulate filter. Also, the engine, the final drive, and the transmission were identified as breakout items during this review. These items were not recommended for breakout because the acquisition strategy called for a 1-year competitive procurement with five priced options, and the project office did not have enough time to break out the three components before the planned contract award date of August 1986. The problems, risks, and decisions were not supported by detailed records that showed net cost savings and analysis to support a breakout decision as required by DFARS 217.7202.

Potential Breakout Candidates. Our review of the M9 ACE's production bill of materials disclosed six potential breakout candidates that met the criteria stated in DFARS 217.7202. These six are the engine, transmission, track shoe assembly, corner rotary actuator, interior rotary actuator, and steering unit. We presented these candidates to the project office for an evaluation of their suitability for breakout. In December 1988, the project office cited four major factors for not considering these items, as well as a more extensive component breakout program. These factors were:

- In the early production years, the M9 ACE Project Office did not pursue breakout because the technical data package was redrawn with new design specifications, and it considered breakout a risk that might adversely affect the program's cost and schedule. For the later program years, breakout was not warranted because it would have required awarding and administering new contracts with vendors and negotiating with the prime contractor in a sole-source environment.

- The Army would probably bear the expense to resolve a first article test issue for the M9 ACE vehicle if the contractor claimed that the Government-furnished component caused the problem.

- The Army would be responsible for any problems associated with Government-furnished components that affect the contractor's ability to meet production delivery schedules. Currently, the contractor is responsible for resolving these problems at no cost to the Army.

- The Army would incur additional management and administrative costs to perform the breakout study and to award and manage separate contracts for items selected for breakout.

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[3] This March 1986 component breakout review superseded an earlier July 1983 review.

These management costs may be greater than the potential savings achieved from eliminating the contractor's markup costs.

DFARS 217.7202 provides guidelines and criteria, in addition to information on net savings, to consider in making a decision on component breakout. These factors include design stability, quality, reliability, and performance. Further, if conditions are currently unfavorable to breakout, the feasibility of eliminating such conditions should be considered.

In discussions with staff engineers of the M9 ACE Project Office, it was disclosed that most of the previously claimed difficulties for the Army's potential breakout candidates have been, or could be, resolved. Since the production contract was awarded in July 1986, the contractor's production line was established, and it has been producing M9 ACE vehicles. The six potential breakout items have not been experiencing any significant problems during the M9 ACE's performance tests. Further, our discussion with BMY Corporation's management personnel did not indicate any subcontractor delivery or technical problems for these six components.

We considered the engine a good candidate for breakout. The M9 ACE uses the same VT 903 model engine block as the Bradley Fighting Vehicle. The engine for both vehicles is produced by the same company, and they are manufactured on the same production line. The engine manufacturer said that the same costing base is used for all VT 903 model engines. Therefore, the Government would be charged the same price as the BMY Corporation. The Bradley engine was being procured as a breakout item on a separate contract. The Army's buyer for the Bradley engine told us that she saw few problems in adding the M9 ACE engine as a line item to the contract.

We also noted that on March 18, 1986, the Under Secretary of the Army sent a letter to TACOM advising it of the need to consolidate roadwheel requirements for all tracked vehicles and to furnish the roadwheels to the prime contractor as Government-furnished material. The M9 ACE Project Office did not plan to break out the roadwheels, but amended the M9 ACE production contract to allow for breakout of the roadwheels. We estimated that the Army will save at least $1 million over the life cycle of the M9 ACE program from breakout of the roadwheels.

Management Costs. DFARS 217.7202 states that estimates of potential savings should be developed for each case considering any estimated offsetting costs, such as contracting, contract administration, material inspection, transportation, and technical support. (See DFARS 217.7202-4b[12] for a complete list.)

We asked the Army Materiel Command's and TACOM's personnel if they had developed a method to determine the management costs associated with breakout. The Army stated that it did not have a standardized method of developing cost estimates for the management cost burden for determining the net cost savings. The Army considered current guidance adequate; however, it had not developed costs for breakout programs. We were able to identify and obtain component breakout cost study methodology for systems within the U.S. Naval Air Systems Command. We found three [4/] systems that the Navy had used as a basis for estimating management costs associated with breaking out components for direct Government procurement. The additional Government management costs associated with component breakout averaged 5.7 percent of the component's total procurement cost for the three Navy breakout cases. (See Appendix C for details.)

Potential Savings. A potential net savings of about $4.3 million in contractor markup costs for six components could be realized for the remainder of the Army's program. The Army has exercised contract options for 302 of the 566 vehicles on the M9 ACE production contract; therefore, savings may be achieved for the remaining 264 vehicles and associated spare parts. In addition, the Marine Corps plans to ask the Army to procure 257 vehicles, and as a result, a potential net savings of about $4.2 million could be realized if the 6 components were broken out for these vehicles. Therefore, the combined savings from the Army's and the Marine Corps' programs would be $8.5 million from eliminating the contractor's indirect cost and profit associated with subcontracted items (Appendix D). We also adjusted the potential benefits by offsetting Government management costs for procuring the components as Government-furnished equipment and providing the components to the contractor. We consider the $8.5 million to be a minimum savings because we expect the 5.7-percent offsetting costs to be less for the VT903 engine due to the Army purchasing a similar engine for the Bradley Fighting Vehicle as a breakout component.

Army Breakout Guidance. In previous DoD Inspector General audit reports, we reported problems concerning interpretation or implementation of the DFARS 217.7202 component breakout guidance. The Assistant Secretary of the Army (Research, Development and Acquisition) considered the current DFARS 217.7202 guidance adequate. However, the Army Materiel

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[4/] The three Navy systems were the F/A-18 auxiliary power unit, engine; AN/ALR-76, Electronic Support Measures; and 88A HARM missile rocket motor.

Command was developing special guidance to be included in the Army Materiel Command FAR Supplement to further define and more fully address the DFARS requirement for component breakout in the acquisition plans.

RECOMMENDATIONS FOR CORRECTIVE ACTION

1. We recommend that the Commander, U.S. Army Materiel Command, continue to develop and implement a detailed component breakout program for its major commands to use when estimating the Government management costs associated with breakout. These efforts should include a revision of the U.S. Army Materiel Command's Defense Federal Acquisition Regulation Supplement to clarify the Defense Federal Acquisition Regulation Supplement 217.7202 guidance regarding component breakout and include the offsets for estimated management costs associated with these decisions, such as those developed by the Naval Air Systems Command component breakout model.

2. We recommend that the Commander, U.S. Army Tank-Automotive Command:

a. Evaluate and justify decisions on the six possible breakout candidates identified in this report and determine if they warrant breakout for the program as required by Defense Federal Acquisition Regulation Supplement 217.7202, including offsets for estimated management costs associated with these decisions, such as those developed by the Navy's component breakout model.

b. Perform an evaluation of the M9 Armored Combat Earthmover program to identify any other candidates for component breakout following the guidelines of Defense Federal Acquisition Regulation Supplement 217.7202. Document and justify the decisions for all breakout candidates identified.

c. Establish policies, procedures, and controls that will ensure compliance with Defense Federal Acquisition Regulation Supplement 217.7202 regarding component breakout for future acquisitions within your Command. Examples of controls are the use of random reviews or checklists to ensure these policies and procedures are followed.

MANAGEMENT COMMENTS

The Army did not respond to Recommendation C.1. to develop and implement a detailed component breakout program to use when estimating the Government management costs associated with breakout. We request that the Army provide comments on this recommendation when responding to the final report.

The Army concurred with Recommendation C.2.a. to evaluate and justify decisions on the six possible candidates identified in this report and determine if they warrant breakout. Also, the Army stated that "The FAR states, however, that breakout will be considered when an end item award is not based on adequate competition." In the case of the M9 ACE award, it was a fixed-price competitive award. Further, the Army stated that the M9 ACE Program Manager had performed an appropriate analysis of these six breakout candidates, but determined that breakout was not feasible in 1984 because the technical data package had not adequately matured. It also stated that producibility problems resulting in design changes were anticipated and did occur. However, the Army stated that while breakout was deemed impractical for the current acquisition, it would consider the feasibility of component breakout on future buys and thoroughly document decisions reached on breakout candidates.

The Army concurred with Recommendation C.2.b. to identify other candidates for component breakout. The Army also concurred in part with Recommendation C.2.c. and stated that the policy in DFARS 217.7202 is adequate. However, the Army stated it would amplify the Component Breakout Program regulatory guidance in Army's guidance by January 2, 1990. Also, the "Additional Facts" section of its reply stated that the Army Tank-Automotive Command issued a policy memorandum incorporating a checklist for verifying compliance with acquisition policies and the checklist will be used during the development of acquisition plans for all vehicles. The Army nonconcurred with the potential monetary benefits because the program may be adversely affected by breakout of components and because future analysis of the Marine Corps buy may show benefits not recognized at the present time. The complete text of management's comments is in Appendix I.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

The actions that management plans to take on Recommendations C.2.b. and C.2.c. are considered responsive.

We agree with management's statement that breakout will be considered when an end item award is not based on adequate competition. Also, we believe that component breakout is not limited to items from noncompetitive awards. The DoD Inspector General's position on this point is based upon an Army decision made in July 1988 concerning breakout of storage racks for the M1A1 tank. In a July 21, 1988, Army Materiel Command letter (AMC No. D8623), the Command stated "that the DFARS neither prohibits nor mandates breakout of competitively procured components, but encourages such action when it offers the potential for significant benefit to the Government." We concluded that DFARS 217.7202 encourages breakout when the end-item procurements are made on the basis of price competition whenever it offers the potential for significant benefit to the Government.

We disagree that the Army Tank-Automotive Command's 1984 component breakout was appropriate because it did not include an adequate net cost savings and analysis to support a breakout decision as required by DFARS 217.7202. In this 1984 breakout study, the Army concluded that the level of risk was unacceptable due to an unstable technical data package. Also, the Army believed that, by the time the third year of the multiyear production contract was reached, the design and production problems would have stabilized to the point where they could be considered viable for breakout. However, breakout in the middle of a multiyear production contract was not considered feasible because adequate cost consideration could not be obtained during sole-source negotiations with the prime contractor.

We agree that the M9 ACE's technical risks were high during the first years of production and would stabilize in the later years. Our discussions with personnel from BMY Corporation in May 1989 and the subcontractors of the six components in July 1989 indicated that the types of delivery and technical problems encountered during limited production were normal for a new production line. Also, they indicated that these problems on the six components did not impact the production schedules because the M9 ACE was still correcting problems identified during the 1988 Initial Production Test. We recommended breakout for the last 2 years of the multiyear contract because:

- The Army considered the technical data package stable enough to change its acquisition strategy from a two-step to a one-step procurement action in 1986.

- The Army considered the design stable enough to allow the contractor to begin full-rate production in January 1989.

- The Army already set the precedent for this multiyear contract because it broke out the roadwheels in February 1987 after the multiyear contract was awarded in July 1986.

Also, the Army's reply stated that in June 1989, Cummins Engine Company advised BMY Corporation that any future purchases of engines would result in a * per unit price increase. However, in August 1989, Cummins Engine Company informed BMY Corporation that it agreed to honor its original price.

We considered the Army's response to Recommendation C.2.a. and the associated potential monetary benefits not be be totally responsive. Although the Army has agreed to perform and thoroughly document evaluations on future M9 ACE procurement actions, we continue to feel that TACOM should complete its component breakout study of the six proposed breakout candidates and should fully document if breakout would be beneficial for the last 2 years of the multiyear production contract. We, therefore, request that the Army reconsider its opinion and provide additional comments to the final report.

D. Technical Manuals

FINDING

The Army did not receive accurate, complete, and timely technical manuals for the M9 Armored Combat Earthmover (ACE) vehicle from the technical support contractor. This condition occurred because the Tank-Automotive Command (TACOM) and M9 ACE Project Office did not adequately make proper contract preaward decisions. Also, they neither oversaw that contract administration of the technical support contractor was performed adequately nor ensured that a complete validation and verification of the manuals was accomplished as required by DoD Instruction 4151.9, "DoD Technical Manual Program Management." As a result, adequate manuals may not be available to the Army to complete its training plan and to support the current M9 ACE fielding date of October 1989.

DISCUSSION OF DETAILS

Background. Federal Acquisition Regulation (FAR) 42.302 states that contract administration responsibilities include surveillance and quality assurance. The procuring contracting officer (PCO) at TACOM retained the contract administration function for the technical manuals. The M9 ACE Project Office divided responsibilities among the Publication Division, Maintenance Division, and the M9 ACE Project Office for monitoring the contractor's performance in developing and updating the technical manuals. The three major categories of manuals were the Operator Manuals (10 series), the Unit Maintenance Manuals (20 series), and the Intermediate Direct and General Support Maintenance Manuals (34 series). During the integrated logistics support planning in February 1987, TACOM decided to have the Army complete the technical manual provisions on the 86 depot level tasks rather than use contractor support. Therefore, we did not review these tasks.

From 1982 through 1986 Pacific Car and Foundry Company (PACCAR) wrote the initial technical manuals when it developed the M9 ACE. The original manuals were issued to the 13th Engineer Battalion at Fort Ord along with the low-rate initial production vehicles in April 1986.

Our review was primarily limited to the current M9 ACE technical support fixed-price incentive contract (DAAE07-87-C-R031), which TACOM awarded March 19, 1987, to AM General Corporation for $2,804,016. This was a level of effort type contract for 100,000 labor-hours. Three additional contract options have since been exercised to increase the value of the contract to $10,151,394 for 327,000 labor-hours. The contract's statement of work sets forth six major work areas, one of which was directed

toward preparing technical manuals. Those efforts were to ensure that technical manuals were accurate, complete, and ready to support fielding for all levels of maintenance when the system was deployed.

The Logistic Support Analysis Record (LSAR) is the official record that was to be used to prepare the technical manuals. The AM General Corporation's contract states that, by using LSAR as a basis, the contractor shall update the existing M9 ACE technical manuals. The contracting officer issued work directives that tasked AM General Corporation to update and revise the LSAR data base to the current M9 ACE configuration and to ensure that the data base matched the tasks stated in the technical manuals. In addition, DoD Instruction 4151.9, "DoD Technical Manual Program Management," January 3, 1989 (previous version was dated February 4, 1982), requires validation and verification of technical manuals. Validation is a vital part of the contractor's quality assurance program and includes testing the technical manual for completeness, accuracy, and adequacy by performing [5/] the actual operational and maintenance tasks outlined in the manual and using the appropriate configuration of equipment. Verification, which has a quality assurance purpose, is the Government's responsibility, and verification ensures that a technical manual will be suitable for use by operating and maintenance personnel. Army Regulation 25-30, "The Army Integrated Publishing and Printing Program," replaced Army Regulation 310-3, "Preparation, Coordination, and Approval of Department of the Army Publications," on February 28, 1989. These regulations state that validation and verification can be combined when cost or technical reasons preclude a separate validation effort.

Results of Audit. Our review showed that the technical support contractor did not provide the Government with accurate and complete technical manuals for verification and fielding purposes. This condition existed because the TACOM and M9 ACE Project Office did not adequately make proper contract preaward decisions, did not perform adequate contract administration oversight of the technical services contractor, and did not ensure that adequate validation and verification of the manuals was accomplished.

Contract Preaward Decisions. TACOM contract preaward decisions did not ensure that the Army would receive accurate,

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5/ Actual performance validation is also called hands-on validation and is the preferred method. Other validation methods are appropriate in some instances, such as tasks that may damage the system or equipment, tasks that are repetitive, or tasks that only require reviewing checklists.

complete, and timely manuals. The project office did not recognize that the early PACCAR manuals had serious limitations. These manuals were used for fielding the low-rate initial production vehicles to the 13th Engineer Battalion at Fort Ord in April 1986. The Fort Ord maintenance personnel found that instructions in these manuals were generally inaccurate and difficult to follow. After maintenance personnel attempted to document problems with the manuals [6/], the maintenance personnel discontinued using the manuals, except as a reference for such items as torque specification. TACOM did not take corrective action on the PACCAR manuals before the AM General Corporation used them to develop its technical manuals. The situation became more complicated when the current contract was awarded to a contractor with limited experience with track vehicles. TACOM's preaward survey report documented that AM General Corporation lacked experience in track vehicles, but TACOM still awarded the contract to it.

Contract Administration. According to the FAR, monitoring contractor performance refers to Government contract administration that attempts to determine the degree of progress made by a contractor in meeting the contract performance schedule and to identify factors that may affect contractor performance. The Project Office had fragmented responsibilities by delegating TACOM's Maintenance and Publication Divisions to develop the M9 ACE technical manuals; this action resulted in inadequate centralized management of technical manuals. As a result, when the project office held in-process reviews for the total technical services contract, contractor performance problems were not always discussed regarding the technical manuals. The project office did not hold separate in-process reviews, except during the validation and verification procedures, to ensure that the manuals were prepared according to the contract terms and specifications. In-process reviews should evaluate contractor compliance with requirements, assess program progress, and provide guidance or dictate corrective action during crucial points in the development of manuals.

The project management office's failure to perform proper in-process reviews for the M9 ACE program resulted in the untimely assessment and correction of technical manual deficiencies and in contract requirements not being accomplished.

[6/] Fort Ord maintenance personnel submitted Department of Army Forms 2028-2, "Recommended Changes to Equipment Technical Manuals," to TACOM from June 1986 to July 1987. We reviewed 21 Forms that Fort Ord and TACOM personnel had retained. Fort Ord was unable to provide documentation that any additional Forms 2028-2 had been submitted to TACOM.

Assessment of Manual Deficiencies. In June 1988, AM General Corporation provided draft technical manuals for the M9 ACE's initial production testing. These manuals were inaccurate and were set aside after 1 week of use by maintenance personnel, but were used as a reference for such items as torque specifications. Since the Army failed to recognize the inadequacy of the PACCAR manuals and did not hold specific in-process reviews with the contractor during development of the manuals, the problem with inaccurate draft manuals was not identified until 15 months after contract award.

Contractor Requirements. The technical support contract required AM General Corporation to prepare and deliver a validation and verification plan, to reconcile technical manual tasks to the LSAR data base and to perform a validation and verification of technical manual changes and updates. We found that a validation and verification plan, which is needed to ensure that the validation and verification is completed before the manuals are delivered, was not developed by AM General Corporation. The project office did not ensure that technical manuals were complete because the reconciliation of the technical manual tasks to the LSAR data base was not performed. Also, the contractor did not perform validation and verification of all technical manual changes or updates (as discussed in the next paragraph).

Validation and Verification Procedures. The M9 ACE technical support contract required AM General Corporation to perform a validation of the technical manual changes and updates. The Army's Project Office directed that verification of the technical manual changes and updates should be performed as a joint effort by the contractor and the Army. In March 1988, AM General Corporation began the first of four review procedures to validate and verify manual tasks. These four procedures were completed by February 1989. We found that only 239 (32 percent) of the 743 tasks identified in the LSAR for the 3 series of technical manuals were validated and verified as shown below.

Validation/ Verification Procedure	Dates Procedures Completed	Number of LSAR Tasks Performed	Number of Tasks Identified to LSAR Data base
Update 6	April 1988	45	37
PT/LD [1]	September 1988	296	198
Troubleshooting	October 1988	1	1
Update 7	February 1989	56	50
		398 [2]	286 [2]
Less Duplication or repeated validation/ verification of same task			(47)
Total tasks having validation and verification procedures performed			239

[1] Physical teardown and logistic demonstration.

[2] The Army validated and verified an additional 112 tasks (398 minus 286) that were not properly recorded in the LSAR data base. We used the LSAR data base to determine the total number of manual tasks to be validated and verified.

Even though the contractor validated and verified 398 tasks, this only represented 239 tasks that we could identify to the LSAR data base during our review, which indicated that the data base did not accurately reflect the tasks in the technical manuals.

In June 1988, the Army extended the performance period for AM General Corporation's validation and verification effort, which was conducted as part of the physical teardown and logistics demonstration, to correct manual discrepancies and address vehicle changes made as a result of the initial production tests. The U.S. Army Engineering Center, Fort Leonard Wood, provided maintenance sergeants to participate in this validation and verification at AM General Corporation. During this validation and verification effort, 296 manual tasks were covered and 235 of the 296 tasks needed corrections or improvements. This resulted primarily in the Engineering Center sergeants and TACOM civilian personnel rewriting or making changes to the procedures for the 235 tasks. We believe that the Army sergeants were used to supplement the limited experience of the contractor with preparing manuals for track vehicles.

As of April 1989, AM General Corporation only validated and verified 239 of the total 743 tasks, and the M9 ACE's Project Office did not plan to validate and verify any additional tasks for the M9 ACE program. Our review of the validation and verification results showed that 215 of the 239 tasks needed to be rewritten to correct and improve the manuals. In a March 1989 memorandum on technical manuals for initial fielding,

the M9 ACE Program Office stated that the original PACCAR manuals needed a complete overhaul. We asked the maintenance and operator personnel for examples of its recommended changes to the manuals from the initial production tests, validation and verification, and Department of Army Forms 2028-2, and we found that 23 of the 25 changes were not incorporated into the latest versions of the manuals. Appendix E provides examples of these changes that have not been incorporated into the latest technical manuals as of April 1989. Based on the rewrites from the validation and verification and the condition of the original PACCAR technical manuals, TACOM needs to perform a verification of all remaining tasks and ensure that the contractor incorporates these changes into the manuals.

Potential Training and Fielding Delays. The Army's training plan provides that instruction for the troops will start in September 1989 for the operator's course (10 series manual) and October 1989 for the maintenance course (20 and 34 series manuals). These dates coincide with the fielding, which was planned for October 1989, of the M9 ACE to operational units. AM General Corporation did not give marked up and partially verified and validated copies of the manuals to the Engineering Center, Fort Leonard Wood, until March 1989 to begin developing the Army's plan of instruction. Before March 1989, the Engineering Center received the old PACCAR manuals and early updates of the AM General Corporation's manuals. Training and Doctrine Command Regulation 351-1, "Training Requirement Analysis System," January 16, 1984, requires that the plan of instruction be completed 6 months before the beginning of classroom instruction. At the end of our audit, the M9 ACE Project Office still had not developed a definitive plan to resolve the manual's accuracy problems. The manuals are needed to support development of the training program and fielding of the vehicle.

Conclusion. Accurate, complete, and timely technical manuals were not provided for the M9 ACE's initial production testing (June 1988), expanded comparison production testing (February 1989), and plan of instruction (March 1989). The manuals will require extensive validation and verification efforts to ensure that they will be fully usable by the troops in the field. Adequate technical manuals may not be available to complete the Army's training plan and to support the M9 ACE planned fielding date of October 1989.

RECOMMENDATIONS FOR CORRECTIVE ACTIONS

We recommend that the Commander, U.S. Army Tank-Automotive Command:

1. Reconcile the technical manual tasks to the Logistics Support Analysis Record data base to ensure the M9 Armored Combat Earthmover manuals are complete and accurate.

2. Develop and execute a plan to perform the verification of all remaining technical manual tasks not validated and verified by AM General Corporation as required by DoD Instruction 4151.9. This Government verification effort should be conducted using personnel with skill levels equivalent to those of the target users required to maintain the equipment or system in the operational environment.

3. Require that the M9 Armored Combat Earthmover's Project Office centralize its management as required by DoD Instruction 4151.9 to ensure that close monitoring of contractor performance is complete and that accurate manuals are delivered to the troops. This monitoring would include separate in-process reviews with the contractor to evaluate contractor compliance with requirements, to assess program progress, and to provide guidance or dictate corrective action.

MANAGEMENT COMMENTS

The Army nonconcurred with draft Recommendation D.1. (renumbered Recommendation D.2.) to develop a plan to perform the validation and verification of all remaining technical manual tasks. The Army stated that there is no direct correlation between LSAR tasks and technical manual tasks, and it was wrong to examine technical manual validation and verification records by analyzing LSAR tasks. Also, the Army's analysis of the 338 maintenance tasks in the technical manuals shows that all 338 tasks were validated and verified, but it could find validation and verification records for only 328 tasks.

The Army nonconcurred with draft Recommendation D.2.(renumbered Recommendation D.3.), and it stated the proper management structure is in place and appropriate publications and logistics in-process reviews have been conducted throughout the term of the contract. A complete text of management's comments is in Appendix I.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

Because the Army will field the M9 ACE system in October 1989 and disagrees with using the LSAR to examine technical manual validation and verification records, we have:

- deleted Recommendation D.3.,

- added a recommendation to reconcile the technical manuals to LSAR data base, and

- revised draft Recommendation D.1. (renumbered Recommendation D.2.) to only require a verification by the actual users of the manuals for the remaining technical manuals not validated under the current technical support contract.

We do not agree that there is no direct correlation between LSAR tasks and technical manual tasks. On May 12, 1989, representatives from the M9 ACE Project Office and the TACOM Publications Division agreed with us that the LSAR contained 743 maintenance tasks, of which a total of only 398 tasks were validated and verified by the AM General Corporation. As we stated in the finding, these 398 tasks actually cover validation and verification of 239 tasks. However, the Army Tank-Automotive Command (TACOM) changed its position in the response to the draft of this report. The Army stated that it was wrong for us to examine technical manual validation and verification records by analyzing the LSAR data base. We disagree because TACOM's contract with AM General Corporation required that the LSAR data base be matched with the technical manuals. Also, Military Standard 1388.1A, "Logistic Support Analysis," and Military Standard 1388.2A, "DoD Requirements for a Logistic Support Analysis Record," states that the LSAR data base will be used as the baseline for technical manuals. We believe that the technical manual tasks should be reconciled to the LSAR data base to ensure the troops are provided complete and accurate manuals. We request that Army provide comments to Recommendation D.1. in the response to the final report.

As stated in the finding, AM General Corporation only validated and verified 239 of the total 743 tasks. TACOM's analysis of the technical manuals identified 338 tasks of which 328 were documented as validated and verified. However, 202 of the 328 tasks were validated and verified prior to the AM General Corporation contract in March 1987. These 202 tasks were validated and verified from August 1984 to December 1984 by PACCAR and delivered as the initial technical manuals. As stated in the finding, the users found that these manuals were generally inaccurate and difficult to follow. Also, the Army experienced problems with draft technical manuals during the June 1988 initial production testing, which included these 202 tasks. We still believe that the technical manual tasks, which were not validated or verified by AM General Corporation, need to be properly verified and changes incorporated into the next manual revision. This would allow the Army to field the M9 ACE as planned in October 1989 and ensure that the users receive complete and accurate technical manuals. We request that the Army provide comments to Recommendation D.2. in the response to the final report.

We still believe that Recommendation D.3., which requires the M9 ACE Project Office to centralize its management to ensure close monitoring of contractor performance, is appropriate. We agree that the Army held in-process reviews for the total technical services contract, which included technical manuals, and held in-process reviews during the validation and verification procedures. However, these reviews failed to ensure that technical manuals were written to conform to contract requirements and failed to identify inaccurate manuals early in the manual development process. We therefore request that the Army reconsider its opinion and provide comments to the final report.

E. Standardization of Parts

FINDING

The Army did not adequately pursue a material standardization and specification program for the M9 Armored Combat Earthmover (ACE) to minimize the system's life-cycle support costs. This condition occurred because the Tank-Automotive Command (TACOM) did not institute an effective standardization program for parts control as required by DoD Instruction 4120.19, "DoD Parts Control Program." The addition of similar parts already in the Defense supply system could result in unnecessary expenditures of $5.4 million for the M9 ACE program.

DISCUSSION OF DETAILS

Background. Provisioning is a management process for determining and acquiring the variety and quantity of support items necessary to operate and maintain an end-item. In an effort to minimize life-cycle provisioning, maintenance, and DoD supply system costs, DoD has implemented the Parts Control Program. The objectives of the program are:

- to conserve resources and reduce life-cycle costs by reducing the varieties of component parts;

- to promote the application of established standard parts or parts with multiple applications of known performance during the design, development, production, or modification of equipment and weapon systems; and

- to apply engineering techniques that may assist system acquisition managers and their contractors in identifying and selecting established standard parts or parts with multiple applications to enhance interdepartmental or intradepartmental system's commonality, interchangeability, reliability, maintainability, standardization, and interoperability.

United States Code, title 10, chapter 145, section 2451, "Cataloging and Standardization," requires that the Secretary of Defense shall develop a single catalog system and related program to standardize supplies for DoD. In standardizing supplies, the law states that, to the highest degree practicable, standardized items shall be used throughout DoD by developing and using single specifications, eliminating overlapping and duplicate specifications, and reducing the number of sizes and kinds of items that are generally similar. DoD Directive 4120.3, "Defense Standardization and Specification Program," June 6, 1973, states that standardization shall be an essential consideration during system and equipment acquisition. Also, the directive states that military operational requirements shall be satisfied to the maximum practical extent through the use of existing acceptable commercial and military designs, products, and practices.

An integral part of the DoD Standardization Program is the Parts Control Program. DoD Instruction 4120.19, "DoD Parts Control Program," December 16, 1976, establishes policy and assigns responsibilities for the program. Army Regulation 700-60, "DoD Parts Control Program," implemented DoD Instruction 4120.19 on October 5, 1977, for Army programs.

DoD established Military Parts Control Advisory Groups (MPCAG's) at the Defense Logistics Agency's (DLA) Defense Electronics Supply Center, Defense Industrial Supply Center, Defense General Supply Center, and Defense Construction Supply Center. These advisory groups provide engineering advice and recommendations to DoD components and contractors on the selection and use of parts. When Military Standard 965A, "Parts Control Program," is required in the contract, the contractor is required to submit documents in support of proposed parts to the appropriate advisory groups. The advisory groups review the parts documentation submitted by the contractor and they either approve the part or recommend a substitute part already in the DoD supply system. Also, Military Standard 965A requires the contractor to perform early engineering screening to minimize using various parts in new designs by using standard parts. This early engineering screening is an essential part of the standardization process because it helps identify repair parts that are in the DoD supply system.

The M9 ACE provisioning lists, dated July 11, 1988, contained 3,857 parts. About 95 percent of these 3,857 parts (or 3,655 parts) was under the commodity responsibility of the 4 inventory control centers. The balance of 202 parts was the commodity responsibility of the General Services Administration and it was excluded from our audit.

Results of Audit. TACOM had not ensured that adequate standardization had been accomplished for the M9 ACE system as required by DoD Instruction 4120.19. As a result, we estimated that about 473 of the M9 ACE's 3,655 provisioned parts could be satisfied by other parts in the DoD supply system. By eliminating these 473 items, the Army would preclude the unnecessary expenditure of about $5.4 million for the M9 ACE program.

Adequacy of Program Parts Standardization. DoD Instruction 4120.19 required the M9 ACE Project Office to implement the DoD Parts Control Program for the M9 ACE system. We selected a random sample from the 3,655 provisioned parts to evaluate the Army's effectiveness in using provisioning screening procedures and practices for the M9 ACE system. The 3,655 parts represented the provisioned parts for the M9 ACE system under the commodity responsibility of DLA. Using statistical sampling techniques, we randomly selected 222 of the 3,655 parts to review. We prepared

and gave four separate parts lists to the respective DLA MPCAG's for detailed reviews. The MPCAG's reviewed the 222 sample parts and identified 35 provisioned parts that could be satisfied with parts in the DoD supply system. Some examples of these provisioned parts are metallic hose, pipe plug, and washer (Appendix F).

Projecting the audit sample results to the total population of 3,655 parts, we estimated that 473 parts could be satisfied by other similar or potential substitute items in the DoD supply system. Our projection was based on results from each DLA activity (Appendix G) and a 90-percent confidence level. We projected that by eliminating 473 parts from the DoD supply system, the M9 ACE program would save about $5.4 million in life cycle costs. As shown in Appendix G, the projected savings was determined by multiplying the average life-cycle cost avoidance for each DLA activity by the projected sample parts that could be standardized (total 473 parts) for each DLA activity. The average life-cycle cost avoidance was based on eliminating the need to document, test, inventory, and maintain parts in the DoD supply system. A description of cost-avoidance benefits of the parts control program is in Appendix H.

Developer's Standardized Program. The M9 ACE program had been in development since 1956 and materiel developer responsibility was transferred from the Belvoir Research and Development Command to TACOM in 1982. The M9 ACE Project Office established a standardization program as required by DoD Directive 4120.3. Also, the project office incorporated the standardization program into the Integrated Logistics Support Plan. Our review disclosed that the Belvoir Research and Development Command had entered 3,639 of the 3,655 M9 ACE parts into the DoD supply system, while BMY Corporation (M9 ACE Project Office's prime contractor) entered 16 parts. In discussions with personnel of both development Commands, we learned that standardization was not a high priority during the system's development process. Also, TACOM did not attempt to update or validate the adequacy of prior standardization efforts on the 3,639 parts transferred to it.

Army Regulation 700-60 states that each Army element is responsible for development and acquisition of military materiel and for implementation of the mandatory Parts Control Program to ensure the policies and objectives of DoD Parts Control Program are accomplished. In July 1986, the M9 ACE production contract was awarded to BMY Corporation, and the contract required the BMY Corporation to implement the DoD Parts Control Program. However, the contract did not require BMY Corporation to verify the adequacy of the prior standardization effort, which represented 3,639 of the M9 ACE's 3,655 parts in the DoD supply system. For the 35 parts identified that could be

satisfied with parts in the supply system, MPCAG informed us that these parts were not previously submitted for review as required by the DoD Parts Control Program. Therefore, neither the M9 ACE Project Office nor the Belvoir Research and Development Command had adequately monitored its production contractors to ensure that the materiel standardization and specification program for the M9 ACE had been fully implemented.

RECOMMENDATIONS FOR CORRECTIVE ACTIONS

We recommend that the Commander, U.S. Army Tank-Automotive Command, direct the M9 Armored Combat Earthmover Project Manager to:

1. Perform an in-depth engineering screening of M9 Armored Combat Earthmover parts together with the Tank-Automotive Command's standardization branch and fully coordinate results of the review with the Defense Logistics Agency's Military Parts Control Advisory Groups as required by Army Regulation 700-60, "DoD Parts Control Program."

2. Strengthen procedures to ensure that the contractor adheres to the contract requirements for a parts control program as required by DoD Instruction 4120.19 and implemented by Military Standard 965A. The Military Parts Control Advisory Groups should be consulted in making these determinations, and the project office should maintain documentation to support these decisions.

MANAGEMENT COMMENTS

The Army nonconcurred with Recommendation E.1. and stated that screening for standardization is of the greatest benefit when done early in the design of a program, which for the M9 ACE, occurred many years ago. Also, the Army stated that it is inappropriate to expend resources at this point to completely rescreen all provisioned parts. The Army conducted a review of the 35 parts that we suggested could be substituted for currently provisioned M9 ACE parts and found only 1 part was technically feasible for substitution. Also, BMY Corporation has submitted 16 parts under Military Standard 965 for screening to the Military Parts Control Advisory Groups.

The Army concurred with Recommendation E.2. and stated that the Army Materiel Command will, in the near future, initiate action to strengthen guidance relative to the DoD Parts Control Program procedure by changes in Army Regulation 700-60 in order to reduce the unnecessary proliferation of parts. The full text of management's comments is in Appendix I.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

We believe that the M9 ACE is a very special case because it is a system that has been in development since 1956 and most of the parts were entered into the DoD Supply System before the DoD standardization emphasis started in the 1970's. Secondly, many new items have entered the DoD Supply System from numerous sources. These two facts, coupled with results of our standardization review on the M9 ACE, appear to introduce a great opportunity to reduce the life-cycle vehicle operating and DoD Supply System costs over the next 15 years through parts standardization.

We disagree with the results of the Army's review of the 35 parts because the Army did not coordinate its efforts with the DLA MPCAG's. Army Regulation 700-60 requires the Army Components to fully coordinate results of its screening reviews with the MPCAG's. Our review of the 35 parts was fully coordinated with the MPCAG's, and they agreed that these 35 parts could be satisfied by other parts in the DoD supply system. We continue to believe that Recommendation E.1. provides the opportunity for the Army to save as much as $5.4 million in vehicle life-cycle operating and DoD Supply System costs. We request that the Army reconsider its opinion and provide comments to Recommendation E.1. and potential monetary benefits to the final report.

The actions that management plans to take on Recommendation E.2. are considered responsive. We agree with the Army and have revised the finding to properly reflect that 16 M9 ACE parts were entered into the DoD Supply System by BMY Corporation.

SCHEDULE OF ROADWHEEL MODIFICATION COSTS
(Per Army PCO and Per Audit)

Contract DAAE07-86-C-R100 Line Items	Per Army PCO [1]	Per Audit [2]	Difference
2001	$ *	$ *	$ *
3001	*	*	*
4001	*	*	*
5001	*	*	*
6001	*	*	*
7001	*	*	*
	$ * [3]	$ *	$ * [4]

[1] Per the Army's procuring contracting officer, BMY Corporation's initial offer (June 10, 1986) and Best and Final Offer (July 11, 1986) were based on a subcontractor quote, dated March 13, 1986, of * per roadwheel. Using this quote, the Tank-Automotive Command calculated the roadwheel amounts for deletion from Contract No. DAAE07-86-C-R100.

[2] Based on cost and pricing data (July 8, 1986) used to support the basic contract award. BMY Corporation offered these data to the Army, although the Army did not request them. BMY Corporation used a * subcontractor quote for production years 1 and 2, then it applied an escalation factor in the later option production years and finally it decremented the material cost to arrive at its best and final offer.

[3] The total modification price is * which includes * for roadwheels and * for special tooling.

[4] Contract modification P00004 was to reduce the contract value by eliminating roadwheels; this amount was erroneously undervalued.

*Contractor Data Deleted

WARRANTY DEFECT THRESHOLDS

Production Contract Line Item Number	Contract and Option	Vehicle Production Quantity	Total Valid Defect Threshold *
1001AB	Basic Contract	22	100
2001AB	1st Option	21	72
3001AB	2nd Option	61	301
4001AB	3rd Option	66	325
5001AB	4th Option	132	658
6001AB	5th Option	132	658
7001AB	6th Option	132	658

* This quantity of vehicle defects must be met before warranty coverage becomes effective. The definition of what constitutes a vehicle defect is set forth in the Special Provisions (section H) of the production contract (DAAE07-86-C-R100).

GOVERNMENT MANAGEMENT COST PERCENTAGES FOR COMPONENT BREAKOUT DEVELOPED BY THE NAVAL AIR SYSTEMS COMMAND [1]

	88A Rocket [2]	ALR-76 [2]	F/A-18 [2]
Government Management Costs Per Unit or System [3]	$ 291	$ 30,662	$ 10,027
Government Cost Per Unit or System to Purchase	$ 20,912	$698,000	$ 88,503
Percentage of Government Management Costs Per Unit or System [4]	1.4	4.4	11.3

[1] The Naval Air Systems Command used three systems for its first full component breakout study series to identify Government management costs associated with component breakout.

[2] The names of the three test systems are 88A HARM rocket motor; AN/ALR-76 electronic support measures; and the F/A-18 auxiliary power unit, engine.

[3] The Government management cost per unit includes Government personnel salaries and benefits for both the headquarters and field support (both Service and non-Service). Personnel costs are for administration, procurement and production, contracting, quality assurance, maintenance, data management, and project management. In addition to personnel costs are other costs, such as contractor management services, transportation, receiving and handling, inspection and acceptance testing, depot storage and Government-furnished materiel liabilities (i.e., late delivery or defective materiel).

[4] The average of Government management cost for these three systems was 5.7 percent.

POTENTIAL SAVINGS ESTIMATED FOR COMPONENT BREAKOUT CANDIDATES FOR M9 ACE PROGRAM FOR PRODUCTION YEARS 4 AND 5 [1]

Component Cost Categories	Production Year 4 Production	Production Year 4 Spares	Production Year 5 Production	Production Year 5 Spares	Total
Engine add-on cost [2]	$ *	$ *	$ *	$ *	$ *
Engine base [3]	*	*	*	*	*
Management costs [4]	*	*	*	*	*
Transmission add-on cost	*	*	*	*	*
Transmission base	*	*	*	*	*
Management costs	*	*	*	*	*
Rotary actuator (corner) add-on cost	*	*	*	*	*
Rotary actuator (corner) base	*	*	*	*	*
Management costs	*	*	*	*	*
Rotary actuator (interior) add-on cost	*	*	*	*	*
Rotary actuator (interior) base	*	*	*	*	*
Management costs	*	*	*	*	*
Steer unit add-on	*	*	*	*	*
Steer unit base	*	*	*	*	*
Management costs	*	*	*	*	*
Track shoe assembly add-on cost	*	-	*	-	*
Track shoe assembly base	*	-	*	-	*
Management costs	*	-	*	-	*
Total add-on price [2]	*	*	*	*	*
Total base price [3]	*	*	*	*	*
Gross contr. mgmt. costs	$ *	$ *	$ *	$ *	$ *
Total add-on price [2]	*	*	*	*	*
Total base price [3] with estimated Government offset cost [5]	*	*	*	*	*
Net potential Army savings [6]	$ *	$ *	$ *	$ *	$ *
Contractor's add-on cost factor (percent)	*	*	*	*	

[1] Production years 4 and 5 are for 132 vehicles each.
[2] Basic component cost with contractor management add-on costs.
[3] Basic component cost only.
[4] Contractor management costs.
[5] The Government Management Costs are estimated at 5.7 percent, based on the U.S. Navy averages for three systems (see Appendix C for details).
[6] The net potential Army savings are calculated by subtracting the "Total base price with the estimated Government offset cost" from the "Total add-on price." Minor differences due to rounding of figures.

*Contractor Data Deleted

POTENTIAL SAVINGS ESTIMATED IF COMPONENT BREAKOUT APPLIED TO U.S. MARINE CORPS M9 ACE VEHICLE REQUIREMENTS

We estimated that if the Marine Corps requirements are exercised, the Army could save an additional $4.2 million by procuring the six selected candidates for component breakout. This savings was estimated using the same bases and factors used on page 1 of this Appendix for Army's breakout savings. *

*

* . It also reflects a 5.7-percent offset for the Government's management cost, which was incurred as a result of direct procurement. This savings did not include an escalation factor regarding inflationary considerations. The U.S. Marine Corps plans to procure 257 M9 ACE vehicles. The combined minimum potential savings for both the U.S. Army ($4.3 million) and U.S. Marine Corps ($4.2 million) M9 ACE vehicles would be $8.5 million.

EXAMPLES OF UNCORRECTED TECHNICAL MANUAL TASKS *

Task	Comment
Troubleshooting Guide No. 24, vehicle steers in one direction (Maintenance Manual Series No. 34).	Manual explains that the vehicle will steer in one direction if there are damaged splines or a broken shaft. Actually, if these conditions occur, the vehicle will not steer at all.
Filter support removal and installation (Maintenance Manual Series No. 34).	Manual explains that the power package must be removed from the vehicle. Actually, the power package does not need to be removed from the vehicle to perform the task. This change could potentially save 15 to 20 labor-hours of maintenance time. It is also easier to remove the power package if the filter support is removed first; this could result in saving time to do other tasks.
Power package removal and installation (Maintenance Manual Series No. 34).	Manual explains removal instructions, but does not recommend removal of the ejector. The removal of the ejector will provide easy access into the bowl and make power package removal easier. If the task is being done because of problems with major component filter support, the ejector will have to be removed from the power pack. This change could potentially save 2 labor-hours of maintenance time.
Troubleshooting Guide No. 31, apron does not raise or lower (Maintenance Manual Series No. 34).	Instruction does not recommend checking if the bilge pump is engaged. Field experience has shown this was the most common reason for this problem to occur.

EXAMPLES OF UNCORRECTED TECHNICAL MANUAL TASKS
(Continued)

TASK	COMMENTS
Remove roadwheel (Operator's Manual Series No. 20).	Manual instructs maintenance personnel to install puller on roadwheel arm. This puller is a standard tool, but has not been included in the field tool box. Field personnel have developed procedures to use a tanker bar between the roadwheel arm and the actuator, then tap roadwheel arm with a sledge hammer. There have been numerous replacements in the field using this method, which has not been safety checked. Puller should be included in field tool box.
Steer unit lines, fittings, and breather replacement (Operator's Manual Series No. 20).	This task requires maintenance personnel to drain fluid, but does not explain how to drain fluid. (The same problem exists on the engine and transmission.) Also, a special tool, which is not listed in the tool requirements, is needed to drain fluid. The lack of instructions causes the mechanics to drain the fluid into the hull, which causes a hazard to the environment and personnel.
Condition: Vehicle Loses Oil (Operator's Manual Series No. 20).	When the engine loses oil, it drains into the bottom of the hull. There is no capability to drain the hull without removing the belly plates. When the mechanic, who is under the vehicle, removes the belly plate, he becomes drenched with oil.
Preventive Maintenance Checks and Services (PMCS) (Operator's Manual Series No. 20).	PMCS manual is not arranged to effectively move the mechanic sequentially through and around the vehicle. The tasks as written require the mechanic to get in and out of the vehicle repeatedly.

* Examples provided by Army operator and maintenance personnel who had participated in Initial Production Tests, participated in technical manual validation and verification efforts, or prepared a Department of the Army Form 2028-2, "Recommended Changes to Equipment Technical Manuals."

EXAMPLES OF SAMPLED M9 ARMORED COMBAT EARTHMOVER PARTS THAT COULD BE ELIMINATED BY SIMILAR DOD SUPPLY PARTS

National Stock Number	Developing Command and Date Contractor Submitted Item to DoD Supply System	Item Name	M9 ACE [1] Part Number in DoD Supply System	Other Part Number in DoD Supply System that Could Be Used
4720-01-217-8062	TACOM, October 3, 1985 [2]	Hose, Metallic	12352558-2	WWH1053
4730-01-194-0144	TACOM, November 10, 1984	Adapter Straight Tube	13211E9563	8-8 070122
4730-01-124-3762	TACOM, January 1, 1982	Plug, Pipe	3025460	MS-27769
5305-00-688-2111	Fort Belvoir, 1963 [3]	Screw, Cap, Hexagon H	MS-90728-63	MS-90728-64
5310-00-809-4058	Fort Belvoir, 1962	Washer, Flat	MS-27183-10	MS-27183-52

[1] Armored Combat Earthmover.

[2] U.S. Army Tank-Automotive Command.

[3] U.S. Army Belvoir Research and Development Command.

SCHEDULE OF AUDIT STANDARDIZATION RESULTS RELATING TO M9 ACE PARTS REVIEWED

DLA (MPCAG) [1]	Part Population [2]	Number Sampled	Potential Substitute		Projection: Sample to Population [3]	Average Life-Cycle Cost Avoidance [4]	Projected Potential Life-Cycle Cost Avoidance [5]
			Number of Parts	Percent			
DISC [6]	1,885	72	10	13.889	262	$11,200	$2,934,400
DCSC [7]	1,421	70	7	10.000	142	11,714	1,663,388
DGSC [8]	259	50	7	14.000	36	12,000	432,000
DESC [9]	90	30	11	36.667	33	12,727	419,991
Total	3,655	222	35	12.945 [10]	473	$11,522 [11]	$5,449,779 [12]

1/ Military Parts Control Advisory Groups, Defense Logistics Agency, are located at Defense Supply Centers.

2/ The part population is derived from the M9 ACE provisioning lists, dated July 11, 1988.

3/ Part population times potential substitute percent.

4/ A description of cost-avoidance benefits of the parts control program is provided in Appendix H.

5/ Sample to population times average life-cycle cost avoidance.

6/ Defense Industrial Supply Center.

7/ Defense Construction Supply Center.

8/ Defense General Supply Center.

9/ Defense Electronics Supply Center.

10/ Potential substitute weighted average projection rate (473 divided by 3,655).

11/ Weighted average value for the average life-cycle cost avoidance.

12/ The sample provides a 90-percent confidence level that projection is accurate within ± $1,722,317. The range of projected potential life-cycle cost avoidance is between $3,727,462 and $7,172,096. Rounding has resulted in minor differences in totals.

DESCRIPTION OF COST-AVOIDANCE BENEFITS OF THE PARTS CONTROL PROGRAM

The parts control program fosters standardization, which leads to greater demand for standard parts and reduction in various nonstandard parts entering the logistics systems. DoD Parts Control Program, Cost Benefit Reporting Technique for Military Parts Control Advisory Group (MPCAG), dated April 15, 1988, is a measurement tool to compute potential cost avoidances during the life cycle of equipment. Cost benefits derived are expressed as potential cost avoidances and they do not represent precise dollar savings. The value of a standard part is based on the cost of documentation, testing, inventory, and maintenance. These four cost factors addressed results in standard part's cost-avoidance values that range between $10,000 and $22,000 depending upon the complexity of the product category.

A detailed description of areas of cost considerations from which potential cost-avoidance values are derived is shown below.

Documentation. By using standard parts, the contractor does not need to document nonstandard parts by preparing specifications or source control documents or both. Original equipment manufacturers document nonstandard parts to define the requirements for the parts covered for the system; to ensure that the parts can be procured, are interchangeable, and have configuration control; and to provide the Government a purchase document for provisioning and logistics support. Items that are fully described by military, Federal, or non-Government standards avoid the need for the Government to pay a contractor for preparing documentation for nonstandard parts.

Testing. Quality assurance is important to ensure that the Government receives products that meet DoD requirements. In new designs, quality assurance starts at the piece part level. Nonstandard parts must be tested to ensure performance conditions can be met under military systems operational and readiness criteria. The use of standard parts in new designs avoids retesting nonstandard parts to the reliability and performance requirements necessary to ensure that such parts will perform in a rugged military environment.

Inventory. A new document for nonstandard parts brings with it specific items to be positioned and maintained in the logistics system for many years to support weapon systems and equipment in the field. The use of standard parts yields benefits to the DoD supply system by precluding the provisioning, item identification, stocking, handling, and annual management costs of new items. New items must be accounted for and stock maintained at primary and secondary echelon supply points.

DESCRIPTION OF COST-AVOIDANCE BENEFITS OF THE PARTS CONTROL PROGRAM

Maintenance. The variety and quantity of different nonstandard part types used in a system can significantly increase field failures and drive life-cycle support costs up when failed devices must be located, removed, and replaced. Poor equipment performance (assuming it is not the design itself) is frequently attributable to part failures. Standard parts, particularly high reliability military parts, are specifically produced and tested to work under severe operational conditions.

SARD-ZCS 28 August 1989

MEMORANDUM FOR DEPARTMENT OF DEFENSE INSPECTOR GENERAL

SUBJECT: DOD Inspector General Draft Report on the Acquisition of the M9 Armored Combat Earthmover (ACE) Program (Project No. 8MB-0058)

1. Reference DOD IG report, 30 June 1989, SAB.

2. The reply shows our position on the reported findings and recommendations, as follows:

a. Finding A. Contract Modifications: Concurred with the finding except for the portion on roadwheel contract price reduction. Concurred with two recommendations and nonconcurred with one recommendation.

b. Finding B. Warranty: Concurred with the finding and the four recommendations.

c. Finding C. Component Breakout: Concur with the finding and all three recommendations.

d. Finding D. Technical Manuals: Nonconcurred with the finding and all three recommendations.

e. Finding E. Standardization of Parts: Nonconcurred with the finding and one recommendation. Concurred with one recommendation in part.

3. Actions taken or planned to correct the reported conditions are described in the enclosure. The recommendations for which we agreed to take action will receive Internal Review follow-up to verify the adequacy of corrective action.

FOR THE ASSISTANT SECRETARY OF THE ARMY (RDA):

JOE W. RIGBY
Major General, USA
Deputy for Combat
Service Support

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COMMENTS ON PART I OF REPORT

OPEN TEST ISSUES: Page 9 of the report mentions achieved and projected RAM numbers which do not represent officially published and accepted values. The following table presents the values which properly reflect test progress against QMR requirements. 5

	QMR	IPT (scored)	IPT (assessed)	DODIG Report
MTBF	45 Hours	39.5 Hours	80.2 Hours	53.5 Hours
MR	.45	.50	.32	.48

Also, page 10 indicates the M9 ACE failed the external electromagnetic interference test at White Sands Missile Range, necessitating engineering changes. The results of the tests at White Sands have not yet been documented by a formal TECOM test report. It is, therefore, premature to draw conclusions on the need for any fixes. TACOM will evaluate the report when published and take any necessary actions. 5

INTERNAL CONTROL WEAKNESS: Report page 1 indicates the auditors identified an internal control weakness concerning contractor billings for technical support services. The report concludes that controls had not been established to ensure that contractor submitted billings accurately and fairly represented work completed by the contractor. The "minor discrepancies" discussed on page 13 of the report were not discrepancies but, rather, a misunderstanding by the auditors as to how hours for separate contract line items are reported monthly and presented for payment. Adequate internal control existed to prevent improper payments. 7 7

AUDIT RESPONSE. We did not misunderstand the facts pertinent to the lack of internal controls, and "minor discrepancies" did exist at the time this internal control problem was discussed with M9 ACE Project Office personnel in February 1989. Although the discrepancies were minor in nature, the potential for inaccurate billings were great, because the M9 ACE Project Office (contracting officer technical representative) was authorizing payment without any type of review to ensure that the billings represented actual work performed during the billing period.

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FINDING AND RECOMMENDATIONS A - CONTRACT MODIFICATIONS

FINDING: The Army and the Defense Logistics Agency (DLA) contracting officers had not ensured that modifications to the M9 ACE production contract were being awarded at fair and reasonable prices. For the three contract modifications we audited, the contracting officers did not obtain certified cost and pricing data as required by the Federal Acquisition Regulation (FAR). They also did not perform adequate cost reviews on two of the three modifications. As a result, the contract price reduction for deleting the roadwheels from the contract (modification P00004) was $277,163 less than a fair and reasonable price reduction, and a contract price increase for changing muffler parts (modification A00009) was overstated by $9,075.

ADDITIONAL FACTS: On report page 18, the auditors state BMY offered cost and pricing data to TACOM at the time of the basic production contract award, but TACOM did not request the data because the award was made on a competitive basis. The report further indicates BMY applied an escalation factor to the basic roadwheel costs in later production years and the PCO did not apply these escalation factors in computing the price reduction for the roadwheels. As a result, the auditors concluded that the PCO accepted a price reduction (modification P00004) $277,163 less than appropriate. The statements and conclusion are incorrect and unsupported by the facts contained in the contract file. After initial proposals were received, the PCO requested BMY to provide additional cost and pricing data since what they originally submitted was considered to be insufficient. They responded by providing two large volumes of cost back-up data which were and remain a part of the contract file. No additional back-up data was provided with the Best and Final Offer (BAFO) and no additional data was offered by BMY after the BAFO. 11

Escalation factors were used in computing the Government's negotiating position for the roadwheels as well as for scrap, cash discounts, freight, material handling, G&A, and profit. There were separate factors for each of these areas for fiscal years 87 through 91. Requesting a voluntary reduction would be inconsistent with the facts clearly contained in the contract file.

Finally, concerning the use of field pricing support, it is noted that BMY's basic contract proposal which was used as the basis for the modification P00004 negotiation was the subject of a price analysis which included field pricing support prior to award. The highly competitive atmosphere of the production contract acquisition provided the Government with fair and reasonable prices resulting from competition for the M9 ACE vehicle and its components.

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RECOMMENDATION A1a: Direct the contracting officer for the M9 ACE to obtain certified cost and pricing data on all contract modifications valued at $100,000 or more and prepare price negotiation memorandums as set forth in Federal Acquisition Regulation 15.804 and 15.808.

ACTION TAKEN: Concur. A Procurement Feedback Letter will be issued by 15 October 1989 calling attention to the FAR requirement for certified cost and pricing data and preparation of price negotiation memorandums.

RECOMMENDATION A1b: Direct the contracting officer for the M9 ACE to seek a voluntary reduction of $277,163 from BMY Corporation for modification P00004 of contract number DAAE07-86-C-R100.

ACTION TAKEN: Nonconcur. As discussed above, escalation factors were used in computing the Government's negotiating position for the roadwheel contract price reduction. Information in the contract file does not support the recommended action.

RECOMMENDATION A2: Reemphasize formally to contracting officers the need to fully pursue all of the proposal analysis and field pricing support requirements of Federal Acquisition Regulation 15.805 and Defense Federal Acquisition Regulation Supplement 215.805-5, respectively.

ACTION TAKEN: Concur. A Procurement Feedback Letter will be issued by 15 October 1989 calling attention to the FAR and DFAR requirements for proposal analysis and field pricing support.

POTENTIAL MONETARY BENEFITS: Nonconcur. As discussed above, we noncurred with Recommendation A1b to seek a voluntary reduction of $277,163 from BMY Corporation.

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FINDING AND RECOMMENDATIONS B - WARRANTY

FINDING: The Army has established the M9 ACE's warranty deductible thresholds at high levels, which lessens the opportunity for the Army to recover costs against the warranty. This situation occurred because the Army did not perform a cost review and analysis of the contractor's proposed warranty price of $806 per vehicle as required by Army Regulation 700-139, "Army Warranty Program Concepts and Policies," April 10, 1986, before awarding the contract. After the contract was awarded, the M9 ACE Project Office used inadequate information and data to support the contract's estimated warranty deductible threshold. Also, the Army did not use similar experience from 11 other Tank-Automotive Command systems. In addition, the contractor had not given conveyance warranties for subcontractors' parts and components to the Army as required by the M9 ACE production contract. As a result, the Army may incur at least $456,196 for warranty coverage on its 566 M9 ACE vehicles without obtaining any real coverage to insure against risks, since the probability of reaching the failure thresholds is remote. If the Army contracts for a warranty for the Marine Corps' 257 M9 ACE vehicles on the same basis, the Government may spend an additional $207,142 without any real warranty coverage.

ADDITIONAL FACTS: Although the U.S. Marine Corps has expressed interest in procuring 257 M9 ACE vehicles, formal commitment and funding has not yet been received.

Army Regulation 700-139, Army Warranty Program Concepts and Policies, is being revised. The scheduled completion date is 31 December 1989.

RECOMMENDATION B2a: Direct the contracting officer either to obtain an appropriate warranty threshold based on a complete and accurate cost-effectiveness study or to request a voluntary refund for the existing warranty from the M9 ACE manufacturer.

ACTION TAKEN: Concur. A complete and accurate cost-effectiveness study will be performed to determine the appropriate warranty threshold. The estimated completion date is 30 September 1989. Based on the results of the study, the contracting officer will negotiate appropriate adjustments to the contract price and/or warranty provisions.

RECOMMENDATION B2b: Direct the M9 ACE Project Office to perform a cost-effectiveness review as required by Army Regulation 700-139 before contracting for Marine Corps vehicle warranty requirements.

ACTION TAKEN: Concur. As discussed above, a formal commitment for M9 ACE vehicles has not been received from the U.S. Marine Corps. If Marine Corps interest becomes a firm requirement, a cost-effectiveness review will be performed before contracting for Marine Corps vehicle warranty requirements.

RECOMMENDATION B2c: Direct the M9 ACE Project Manager to identify all of the Army's conveyance warranty rights under production contract number DAAE07-86-C-R100. After this action is completed, update the M9 Armored Combat Earthmover maintenance manuals to make the conveyance warranty information available to Army maintenance personnel in the field.

ACTION TAKEN: Concur. Conveyance warranty rights will be identified and provided to the TACOM Maintenance Directorate for incorporation into the warranty technical bulletin by 28 February 1990.

RECOMMENDATION B2d: Require that cost-effectiveness reviews of all contract warranty cost proposals be properly supported with accurate cost information in accordance with Army Regulation 700-139. As part of these reviews, use warranty experience from other programs and use the best available reliability data for the system's parts or components.

ACTION TAKEN: Concur. A policy letter incorporating the recommended action is being prepared. The scheduled completion date is 31 December 1989.

POTENTIAL MONETARY BENEFITS: Concur in principle with the conclusion that implementation of Recommendations B2a and B2b could result in potential savings of up to $456,196 for the production contract and a potential cost avoidance of up to $207,142 if the Army contracts for Marine Corps vehicles on the same basis. However, exact cost savings and cost avoidance will not be available until the warranty cost-effectiveness study is completed, and a formal Marine Corps commitment is received.

FINDING AND RECOMMENDATIONS C - COMPONENT BREAKOUT

FINDING: The Project Office for the M9 Armored Combat Earthmover did not adequately pursue a detailed component breakout program as required by the Defense Federal Acquisition Regulation Supplement (DFARS) 217.7202. Although the project office performed a limited review of the production contract before contract award, only three major items (engine, final drive, and transmission) were reviewed, and they were not broken out because time did not permit breakout before the planned competitive contract award. Further, the limited review was not supplemented by records that showed net cost savings and analysis to support a favorable or unfavorable breakout. We estimated that breakout of six selected components to the original equipment manufacturers would save the Government about $8.5 million during the remaining life of the M9 ACE production program.

ADDITIONAL FACTS: The FAR states that breakout will be considered when an end item award is not based on adequate competition. The M9 award was a fixed price competitive contract, resulting in a savings of over $200 million compared with the Government's baseline cost estimate. Even if adequate price competition is achieved, FAR policy further provides that breakout should continue to be considered only when substantial net savings will result from (1) greater quantity acquisition or (2) improvement in the logistics support by reduction in variety of parts. Neither of these conditions applied to the M9 acquisition.

We performed an appropriate analysis of potential breakout items in 1984 prior to issuance of the original competitive IFB for M9 full production. This analysis considered the same components suggested by the IG Audit team as potential breakout candidates. The FAR states that consideration must be given to estimated cost savings and the impact on the weapon system in degrading performance, reliability and quality as well as the risk in delaying delivery of components to the prime contractor. The basic premise for not recommending breakout in 1984 was the fact that the Technical Data Package had not matured from producing sufficient items and the risk of technical change was high. The M9 low rate initial production contract was limited to 15 vehicles. Vehicles produced from the 1982 contract were delivered in 1984 and run through an initial production test. These were the first M9 vehicles produced since 1972 when the UETES prototypes were fabricated for check testing. The contractor at that time was Pacific Car and Foundry, which was exercising a new base of vendors for vehicle components. The technical assessment determined that based on past experience on other programs, design changes would be required as a result of producibility problems. It was believed that, by the time the third year of multiyear production was reached, the design and production problems would have stabilized to the point where some of these components could be considered

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viable for breakout. However, given the fact that the contract, both multiyear and single year, with priced options, was fixed priced for a period of six years, breakout in the middle of such a contract was not considered feasible because adequate cost consideration could not be obtained during sole source negotiations with the prime contractor. Therefore, the 1984 analysis recommended no breakout except for Basic Issue Items and communications harnesses. These items were considered to meet the FAR criteria of greater quantity procurement and also do result in cost savings.

Page 4 of the audit report states the contractor's production line has been running since July 1986 and the six potential breakout items had not experienced any significant problems during M9 performance tests. This conclusion is not true. As recently as June 1989, BMY's line of balance showed shortages of rotary actuators and steer units to meet vehicle assembly schedules. For the past three years, the same has been true for other components such as track, engines, and transmissions. It is doubtful that, if the Government was serving as the the procuring agent for these components, it could have expedited delivery any faster than BMY. Therefore, the Government would have been liable in more than one instance for default because of late delivery. Delays in conducting and successfully completing First Article Testing prior to delivery to BMY would have caused production line stoppages for vehicle assembly. Preproduction Engineering Proposals (PPEP's) were made by BMY in order to correct errors and omissions in the Government furnished Technical Data Package. BMY is required to identify those areas that need correction by PPEP submitted for Government approval and apply to contract items and to the Government Technical Data Package at no additional cost. The Government would be liable for cost and schedule increases in the case of Government furnished material. 23

It should be noted that TACOM was directed to breakout the M9 roadwheel in 1986. Significant technical and delivery schedule problems have been experienced with the roadwheel breakout. As a result, the Government is technically in default to BMY because of late and insufficient delivery to the production line. In addition, the current M9 ACE roadwheel contract has been terminated for convenience due to escalating costs for supplies required to build roadwheels. A new contract will be awarded in the near future; however, it is expected that the roadwheel cost to the Government will increase as a result of reduced quantities and escalating material prices. There is still risk that the new contractor will be unable to perform and that the Government will not meet its obligations to BMY for roadwheels.

In June 1989, Cummins Engine Company advised BMY that any future purchase orders for M9 ACE engines would result in a $ * per unit price increase to BMY. This price increase is unilateral, not subject to negotiation, and a direct result of repricing engines furnished to the Government for use in

*Contractor Data Deleted

Bradley Fighting Vehicles. The Bradley has now upgraded to a 600 horsepower engine and the quantity of V903 engines used for the Bradley has significantly dropped. Therefore, fixed cost must be spread over fewer engines including those used in the M9. As long as the engine for the M9 remains contractor furnished material, the cost increase will be borne by BMY, not the Government.

Assuming there was sufficient merit to conduct a new study of potential breakout items, it is unlikely that enough time remains to perform the study, and obtain realistic prices and delivery schedules from potential vendors to match M9 vehicle build schedules.

In response to another DoD Inspector General Report (Acquisition of the 5-ton Truck, 23 December 1988), TACOM issued a policy memorandum incorporating a checklist for verifying compliance with acquisition policies. Development of the policy checklist was in process during this audit and will be used during the development of acquisition plans for all vehicles.

RECOMMENDATION C2a: Evaluate and justify decisions on the six possible breakout candidates identified in this report and determine if they warrant breakout for the program as required by Defense Federal Acquisition Regulation Supplement 217.7202, including offsets for estimated management costs associated with these decisions, such as those developed by the Navy's component breakout model.

ACTION TAKEN: Concur. The auditor's recommendation to evaluate and justify decisions on the six possible breakout candidates identified in this report and determine if they warrant breakout for the program as required by Defense Federal Acquisition Regulation Supplement 217.7202 is appropriate. The FAR states, however, that breakout will be considered when an end item award is not based on adequate competition. The M9 award was a fixed price competitive contract, resulting in a savings of over $200 million compared with the Government's baseline cost estimate. The PM did perform an appropriate analysis of potential breakout items in 1984 prior to issuance of the original competitive IFB for M9 full production. This analysis included the same components suggested by the IG Audit as potential breakout candidates. It was determined that breakout was not feasible in 1984 because the Technical Data Package had not matured from producing sufficient items and the risk of technical change was very high. Based upon previous experience, producibility problems resulting in design changes were anticipated and did occur. While breakout was deemed impractical for this particular acquisition, we will relook the feasibility of component breakout on future buys, including a complete cost analysis to determine cost effectiveness. A final decision concerning breakout will be based on the results of the feasibility study and cost analysis.

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RECOMMENDATION C2b: Perform an evaluation of the M9 ACE program to identify any other candidates for component breakout following the guidelines of Defense Federal Acquisition Regulation Supplement 217.7202. Document and Justify the decisions for all breakout candidates identified.

ACTION TAKEN: Concur. Future evaluation of the M9 ACE program will incorporate more candidates than the previous limited breakout review included. The files will be thoroughly documented to reflect adequate justification for decisions reached on breakout candidates identified.

RECOMMENDATION: Establish policies, procedures, and controls that will ensure compliance with Defense Federal Acquisition Regulation Supplement 217.7202 regarding component breakout for future acquisitions.

ACTION TAKEN: Concur in Part. The policy in DFARS 217.7202 is adequate and does not require clarification, as stated in AMC's memorandum to HQDA dated 7 December 1988 and 28 Feb 1989 memorandum from the Deputy Assistant Secretary of Defense for procurement to the DOD IG. However, several actions have been taken by HQ AMC to amplify the Component Breakout Program regulatory guidance as follows:
(1) Modified AMC FAR Supplement in Draft to be published on or about 2 Jan 90;
(2) Modified AR 70-1 to be published in Oct 89; changed AMC guidance for reviews of Acquisition Plans (AP).

POTENTIAL MONETARY BENEFITS: Nonconcur. As outlines above, there are unknown benefits from component breakout with the M9 ACE program. It may be that the program may even be adversely affected by breakout of components. Future breakout analysis with the USMC buy may show benefits not recognized at the present time.

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FINDING AND RECOMMENDATIONS D - TECHNICAL MANUALS

FINDING: The Army did not receive accurate, complete and timely technical manuals for the M9 Armored Combat Earthmover vehicle from the technical support contractor. This condition occurred because the Tank-Automotive Command and M9 ACE Project Office did not adequately make proper contract preaward decisions. Also, they neither oversaw that contract administration of the technical support contractor was performed adequately nor ensured that a complete validation and verification of the manuals was accomplished as required by DOD Instruction 4151.9, "DoD Technical Manual Program Management." As a result, adequate manuals may not be available to the Army to complete its training plan and to support the current M9 ACE fielding date of October 1989. Also, we estimated that an additional $3.3 million will be required to complete the validation and verification of the manuals.

ADDITIONAL FACTS:

On report page 46, the auditors concluded that the technical support contractor did not provide the Government accurate and complete technical manuals for verification and fielding purposes. They further concluded that this condition existed because the TACOM and M9 ACE Project Office did not adequately make proper contract preaward decisions, did not perform adequate contract administration oversight of the technical services contractor, and did not ensure that adequate validation and verification of the manuals was accomplished. As indicated in the paragraphs below, we strongly disagree with these conclusions. 30

Contract Administration: On page 48 of the report, the auditors stated the project office did not have in-process reviews to ensure that the manuals were prepared according to contract requirements. In fact, numerous such reviews were held to ensure the manuals were prepared correctly. At these meetings, the Government evaluated contractor performance, provided guidance and dictated corrective action, when necessary. 31

Validation and Verification Procedures: As stated on page 50, the auditors used the LSAR database to determine the total number of manual tasks to be validated and verified. We pointed out that there is not a direct correlation between LSAR tasks and TM tasks, especially on an older system such as the M9, whose basic logistics structure was developed before the widespread use of LSAR. To attempt to examine TM verification records by analyzing LSAR tasks was simply the wrong approach for the M9 vehicle. As a result, the finding is totally at odds with the true status of task verification. Our analysis of the 338 maintenance tasks in the technical manuals shows that all 338 tasks were validated and verified. However, verification records exist for only 328 of the tasks, thus we will reverify and redocument the 10 tasks for which records cannot be located. 33

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Potential Training and Fielding Delays: Report page 52 states, AM General Corporation did not give marked-up and partially verified and validated copies of the manuals to the Engineering Center, Fort Leonard Wood, until March 1989 to begin developing the Army's plan of instruction. Contrary to this statement, Fort Leonard Wood was consistently furnished the latest available TMs and changes as they became available, as follows: 34

January 1986	Baseline 3 (LRIP vehicles) manuals
August 1986	Change 1 to Baseline 3 manuals
July 1987	Change 2 to Baseline 3 manuals
June 1988	Baseline 4 IPT manuals
August 1988	Change 1/Change 2 to IPT manuals
March 1989	IPT changes and hydraulic troubleshooting

In addition to the above manuals, draft Programs of Instruction and updates were provided in April 1988 and April 1989. It is also pointed out that of the 338 tasks in the manuals, only eleven are taught in the 12F or 62B courses. In May 1989, the PM provided Fort Leonard Wood with draft copies of these eleven procedures out of the upcoming manuals for fielding. Fort Leonard Wood has not expressed any problem or concern with these procedures.

Other Comments: The current configuration of the vehicle has not been fielded, and the TMs are not yet due. TACOM and the PM are doing everything possible to ensure that the manuals will be accurate, complete, and timely when they are delivered. The auditors' estimate of costs incurred is highly inflated and unsupportable.

RECOMMENDATION D1: Develop and execute a plan to perform the validation and verification of all remaining technical manual tasks as required by DoD Instruction 4151.9. Draft Rec. D.1. renumbered D.2.

ACTION TAKEN: Nonconcur. The 338 tasks in the technical manuals were totally validated and verified. However, verification records could be located for only 328 of the tasks. The completion date for reverifying and redocumenting the remaining 10 tasks is 31 October 1989.

SARDA Response

DOD Inspector General Draft Report
Audit of the Acquisition of the M9 Armored Combat Earthmover (ACE) Program
(Project No. 8MB-0058)

RECOMMENDATION D2: Require that the M9 Armored Combat Earthmover's Project Office centralize its management as required by DoD Instruction 4151.9 to ensure that close monitoring of contractor performance is complete and that accurate manuals are delivered to the troops. This monitoring would include separate in-process reviews with the contractor to evaluate contractor compliance with requirements, to assess program progress, and to provide guidance or dictate corrective action.

Draft Rec. D.2. renumbered D.3.

ACTION TAKEN: Nonconcur. As discussed above, the proper management structure is in place and appropriate publications/logistics in-process reviews have been conducted throughout the term of the contract.

RECOMMENDATION D3: Revise the technical support contract DAAE07-87-C-R031 to reflect changes in the scope of work consistent with plans and methods developed under Recommendation 1 and 2.

Draft Rec. D.3. deleted

ACTION TAKEN: Nonconcur. Revalidation and reverification of the remaining technical manual tasks will be accomplished within the existing scope of work under the technical support contract. Project Office management provides proper monitorship of the contractor.

SARDA Response
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FINDING AND RECOMMENDATIONS E - STANDARDIZATION OF PARTS

FINDING: The Army did not adequately pursue a material standardization and specification program for the M9 Armored Combat Earthmover to minimize the system's life cycle support costs. This condition occurred because the Tank-Automotive Command did not institute an effective standardization program for parts control as required by DoD Instruction 4120.19, "DoD Parts Control Program." The addition of similar parts already in the Defense supply system could result in unnecessary expenditures of $5.4 million for the M9 ACE program.

ADDITIONAL FACTS:

As indicated in the following paragraphs, we strongly disagree with the auditors' conclusion that the Army did not adequately pursue a material standardization and specification program for the M9 ACE to minimize the system's life cycle support costs.

As stated in the audit report, the M9 ACE was under development from 1956 until Type Classification Standard A in 1977. This is the time frame in which the bulk of the design of the M9 ACE was solidified and during which the parts were provisioned into the supply system. However, the requirement for parts standardization was not implemented within DOD until October 1977 with the issuance of DOD instruction 4120.19.

Page 60 of the report states that BMY entered 313 parts into the DOD Supply System on behalf of the M9. BMY has not entered any parts into the DOD Supply System. BMY's responsibility since 1986 has simply been to produce vehicles and spare parts and maintain the Government's Master Drawing Package. In the process of working producibility problems, BMY has submitted only 16 parts under MIL-STD 965 for screening with the MPCAG's. Also, since the Project Manager's Office was transferred to TACOM in 1982, every contract awarded and administered by TACOM has included requirements for the contractor to implement a MIL-STD 965 standardization program. 41

We reviewed the 35 parts the auditors suggested could be substituted for currently provisioned M9 ACE parts. Of the 35 parts, only one was technically feasible for substitution. For several of the 35 parts reviewed, the M9 ACE specifies a Military Standard part number, whereas, the auditors recommended substitution of a commercial part number. There is clearly a preference to use the Military Standard part number in lieu of a commercial part number because there is superior technical data, environmental controls and quality provisions to insure that parts obtained will function and interchange over the life cycle of the weapon system.

SARDA RESPONSE
DOD Inspector General Draft Report
Audit of the Acquisition of the M9 Armored Combat Earthmover (ACE) Program
(Project No. 8MD-0058)

RECOMMENDATION E1: Perform an in-depth engineering screening of M9 Armored Combat Earthmover parts together with the Tank-Automotive Command's standardization branch and fully coordinate results of the review with Defense Logisitics Agency's Military Parts Control Advisory Groups as required by Army Regulation 700-60, "DoD Parts Control Program."

ACTION TAKEN: Nonconcur. The M9 ACE is in the full production stage of its life cycle and has reached design maturity. Screening is of the greatest benefit when it is done early in the design life of a program. For the M9 ACE, that occurred many years ago. Therefore, it is inappropriate to expend resources at this point in time to completely rescreen all provisioned parts.

RECOMMENDATION E2: Strengthen procedures to ensure that the contractor adheres to the contract requirements for a parts control program as required by DoD Instruction 4120.19 and implemented by Military Standard 965A. The Military Parts Control Advisory Groups should be consulted in making these determinations, and the project office should maintain documentation to support these decisions.

ACTION TAKEN: Concur. AMC is taking action to strengthen the DoD Parts Control Program (DoD PCP) procedure and accomplish the recommendation of the IG. AR 700-60 will be changed in the near future to include strengthened guidance on standardization. However, we believe TACOM has, since its assumption of program management for M9 ACE, done an adequate job of implementing a parts standardization program. Contractors comply with MIL STD 965 and report to TACOM monthly on the status of screening activity. Between the contractors and the Directorate of Technical Data in TACOM, adequate records already exist of standardization activity. TACOM will continue to aggressively pursue its standardization program as design changes come about and will comply with all requirements in order to reduce the proliferation of non-standard parts.

POTENTIAL MONETARY BENEFITS: Concur. Monetary benefits of the standardization program are well known. However, in this case standardization is working well and the benefit has already been achieved.

DEFENSE LOGISTICS AGENCY
HEADQUARTERS
CAMERON STATION
ALEXANDRIA, VIRGINIA 22304-6100

IN REPLY REFER TO DLA-CI

30 Aug 89

MEMORANDUM FOR ASSISTANT INSPECTOR GENERAL FOR AUDITING, DEPARTMENT OF DEFENSE

SUBJECT: Draft Report on the Audit of the Acquisition of the M9 Armored Combat Earthmover Program (Project No. 8MB-0058)

This is in response to your 30 Jun 89 memorandum requesting our comments pertaining to the audit of the Acquisition of the M9 Armored Combat Earthmover Program (Project No. 8MB-0058). The attached positions have been approved by Mr. Richard J. Connelly, Acting Deputy Comptroller, Defense Logistics Agency.

FOR THE DIRECTOR:

Stephen J. Zavada, Jr.

3 Encl

STEPHEN J. ZAVADA, JR.
Acting Chief
Internal Review Division
Office of Comptroller

TYPE OF REPORT: AUDIT DATE OF POSITION: 30 Aug 89

PURPOSE OF INPUT: INITIAL POSITION

AUDIT TITLE AND NO.: Audit of the Acquisition of the M9 Armored Combat Earthmover Program (8MB-0058)

FINDING NUMBER A: The Army and the Defense Logistics Agency (DLA) contracting officers had not ensured that modifications to the M9 ACE production contract were being awarded at fair and reasonable prices. For the three contract modifications we audited, the contracting officers did not obtain certified cost and pricing data as required by the Federal Acquisition Regulation (FAR). They also did not perform adequate cost reviews on two of the three modifications. As a result, the contract price reduction for deleting the roadwheels from the contract (modification P00004) was $277,163 less than a fair and reasonable price reduction, and a contract price for changing muffler parts (modification A00009) was overstated by $9,075.

DLA COMMENTS: Concur that price for modification A00009 was overstated. However, we nonconcur with the dollar amount of monetary benefits. See our comments under "MONETARY BENEFITS".

MONETARY BENEFITS: $3,657.70

DLA COMMENTS: Nonconcur on findings regarding DLA. The I.G. presumed that the contractor would purchase all the required material at one time. Because BMY is transitioning to an MRPII material management system, they time phase their purchases, which is permitted per the provisions of DFARS 242.72. BMY purchases material at various points during the production process on the theory that minor increased costs of material would be more economical than the storage costs of excessive, unused inventories. The ACO arrived at a reduction of $3,657.70 instead of $9,075 using the time phasing of purchases and the prices that were in effect at the time the material orders were placed. We cannot comment on the findings regarding the Army.

ESTIMATED REALIZATION DATE: 29 Sep 89
AMOUNT REALIZED:
DATE BENEFITS REALIZED:

ACTION OFFICER: Linda S. Holcombe, DLA-ACA, x47726

DLA APPROVAL: Richard J. Connelly

TYPE OF REPORT: AUDIT DATE OF POSITION: 30 Aug 89

PURPOSE OF INPUT: INITIAL POSITION

AUDIT TITLE AND NO.: Audit of the Acquisition of the M9 Armored Combat Earthmover Program (8MB-0058)

RECOMMENDATION NUMBER A.3.: We recommend that the Director, Defense Logistics Agency, direct the administrative contracting officer at the Defense Contract Administration Services Management Area, Reading, BMY Corporation Residency Office to:

a. Obtain certified cost and pricing data on all contract modifications valued at $100,000 or more and prepare price negotiation memorandums as set forth in Federal Acquisition Regulation 15.804 and 15.808.

b. Obtain a voluntary reduction of $9,075 from BMY Corporation for modification A00009 of contract number DAAE07-86-C-R100.

DLA COMMENTS: Concur with subparagraph a. above and nonconcur with b. We have issued the attached letter, 22 Aug 89, to all ACOs directing them to familiarize themselves with the requirements of FAR 15.804 and 15.808 with regard to obtaining certified cost and pricing data and preparation of price negotiation memoranda. DCASMA Reading BMY will negotiate with BMY to obtain a voluntary reduction in the amount of $3,657.70 for modification A00009 to contract DAAE07-86-C-R100.

DISPOSITION:
[X] Action is ongoing; Estimated Completion Date: 29 Sep 89
[ ] Action is considered complete.

MONETARY BENEFITS: $3,657.70
DLA COMMENTS: DCASMA Reading BMY will negotiate with BMY to obtain a voluntary refund in the amount of $3,657.70.
ESTIMATED REALIZATION DATE: 29 Sep 89
AMOUNT REALIZED:
DATE BENEFITS REALIZED:

ACTION OFFICER: Linda S. Holcombe, DLA-ACA, x47726

DLA APPROVAL: Richard J. Connelly

DEFENSE LOGISTICS AGENCY
HEADQUARTERS
CAMERON STATION
ALEXANDRIA, VIRGINIA 22304-6100

IN REPLY REFER TO DLA-AC

22 AUG 1989

SUBJECT: DLA-AC Letter No. AC-89-35
Acquisition Management

TO: Commanders of DCAS Regions
ATTN: Directors, Contract Management

This letter is directive in nature and expires on 18 August 1990 unless sooner superseded or rescinded. This letter should be circulated to Region and field personnel in the following organizational codes: AC, AF (AF-89-27).

1. References:

a. FAR 15.804, Cost or Pricing Data

b. FAR 15.805, Proposal Analysis

c. FAR 15.808, Price Negotiation Memorandum

d. DLAM 8105.1, Part 15.805, Price/Cost Analysis

e. DLAM 8105.1, Part 90.01, Contract Audit Followup

2. The Office of the Inspector General (IG) recently performed an audit to evaluate acquisition management. As part of their review they audited priced negotiations exceeding $100,000 which were issued by the Administrative Contracting Officers (ACOs). They found that ACOs were not obtaining certified cost or pricing data; proposals were not being analyzed properly, awards were not being made at fair and reasonable prices, and price negotiation memoranda were inadequate.

3. Please ensure that ACOs familiarize themselves with the requirements of references 1.a. through 1.e. to ensure compliance.

FOR THE DIRECTOR:

WILLIAM V. GORDON
Executive Director
Contract Management

TYPE OF REPORT: AUDIT DATE OF POSITION: 30 Aug 89

PURPOSE OF INPUT: INITIAL POSITION

AUDIT TITLE AND NO.: Audit of the Acquisition of the M9 Armored Combat Earthmover Program (8MB-0058)

RECOMMENDATION NUMBER A.4.: We recommend that the Director, Defense Logistics Agency, reemphasize formally to the administrative contracting officers at the Defense Contract Administration Services Management Area, Reading, the need to fully pursue all of the proposal analysis requirements of Federal Acquisition Regulation 15.805.

DLA COMMENTS: Concur. We have issued the attached letter, 22 Aug 89, to all ACOs directing them to familiarize themselves with the proposal analysis requirements contained in FAR 15.805.

DISPOSITION:
[ ] Action is ongoing; Final Estimated Completion Date:
[X] Action is considered complete.

MONETARY BENEFITS: None
DLA COMMENTS:
ESTIMATED REALIZATION DATE:
AMOUNT REALIZED:
DATE BENEFITS REALIZED:

ACTION OFFICER: Linda S. Holcombe, DLA-ACA, x47726

DLA APPROVAL: Richard J. Connelly

DEFENSE LOGISTICS AGENCY
HEADQUARTERS
CAMERON STATION
ALEXANDRIA, VIRGINIA 22304-6100

IN REPLY REFER TO DLA-AC

22 AUG 1989

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3. Please ensure that ACOs familiarize themselves with the requirements of references 1.a. through 1.e. to ensure compliance.

FOR THE DIRECTOR:

WILLIAM V. GORDON
Executive Director
Contract Management

REPORT OF POTENTIAL MONETARY AND OTHER BENEFITS RESULTING FROM THE AUDIT

Recommendation Reference	Decription of Benefits	Amount or Type of Benefits
A.1.b.	Provide a direct reduction to the Army production contract for roadwheel cost.	A potential one-time production contract reduction of $277,163 would involve the following:

Fiscal Year	Amount	Appropriation	Line Item
1987	$ (3,416)	21 2035	2001
1988	22,122	21 2035	3001
1988	23,805	21 2035	4001
1989	67,845	21 2035	5001
1990	77,054	21 2035	6001
1991	89,753	21 2035	7001
	$277,163		

Recommendation Reference	Decription of Benefits	Amount or Type of Benefits
A.3.b.	Provide a direct reduction to the Army production contract for muffler parts cost.	A potential one-time production contract reduction of $9,075 would involve the following:

Fiscal Year	Amount	Appropriation	Line Item
1988	$ 413	21 2035	3001
1988	1,251	21 2035	4001
1989	2,471	21 2035	5001
1990	2,470	21 2035	6001
1991	2,470	21 2035	7001
	$9,075		

Recommendation Reference	Decription of Benefits	Amount or Type of Benefits
B.2.a. and B.2.b.	Provide that the Army and Marine Corps would get cost-effective warranty coverage or coverage would be eliminated.	A potential one-time production contract reduction of $456,196 (appropriation 21 2035 for fiscal years 1986-1991) and a cost avoidance of $207,142 on future Marine Corps production contract (appropriation 17 1109 for fiscal years 1992 and 1993).

REPORT OF POTENTIAL MONETARY AND OTHER BENEFITS RESULTING FROM THE AUDIT (CONTINUED)

C.2.a.	Reduce production contract cost by eliminating unnecessary contractor management cost and have the Government supply the component to the contractor.	The cost avoidance would involve the following:

Fiscal Year	Amount	Appropriation
1990	$2,151,760	21 2035
1991	2,172,806	21 2035
1992	2,104,950	17 1109
1993	2,104,949	17 1109
Total	$8,534,465 *	

D.1. through D.3.	Provide quality technical manuals to the troops and minimize expenditure of Army funds through close monitoring of contractor performance.	Undeterminable
E.1. and E.2.	Reduce the unnecessary variety of parts and minimize the life cycle support cost of the M9 Armored Combat Earthmover program.	Estimated annual cost avoidance for fiscal years 1990-1994 of $363,319 per year (appropriation 21 2035) for a total of $1,816,595.

* The component breakout cost avoidance represents the total costs of the selected components (basic production quantities and spare parts), including contractor's add-on charges minus what it would cost for the Government to purchase the components directly (Government acquisition cost plus estimated Government management costs).

ACTIVITIES VISITED OR CONTACTED

Department of Defense

Office of the Under Secretary of Defense for Acquisition, Washington, DC
Office of the Director, Operational Test and Evaluation, Washington, DC
Defense Logistics Agency, Alexandria, VA
Defense Contract Administration Services Management Area, Reading, Bowen McLaughlin York Corporation, Residence Office, York, PA
Defense Industrial Supply Center, Philadelphia, PA
Defense Construction Supply Center, Columbus, OH
Defense General Supply Center, Richmond, VA
Defense Electronics Supply Center, Dayton, OH

Department of the Army

Deputy Under Secretary of the Army for Operations Research, Washington, DC
Deputy Chief of Staff for Operations and Plans, Washington, DC
Deputy Chief of Staff for Logistics, Washington, DC
Deputy Chief of Staff for Research, Development and Acquisition, Washington, DC
Commander, U.S. Army Materiel Command, Alexandria, VA
Commander, U.S. Army Tank-Automotive Command, Warren, MI
U.S. Army Program Executive Office, Heavy Force Modernization
Commander, U.S. Army Operational Test and Evaluation Agency, Falls Church, VA
U.S. Army Combat Systems Test Activity, Aberdeen Proving Ground, MD
Commander, U.S. Army Training and Doctrine Command, Fort Monroe, VA
Deputy Chief of Staff for Operations and Plans, Washington, DC
Commander, U.S. Army Engineering Center and Fort Leonard Wood, Fort Leonard Wood, MO
Headquarters, 7th Infantry Division (Light) and Fort Ord, Fort Ord, CA
Project Manager for Armored Combat Earthmover, Warren, MI

Department of the Navy

Naval Air Systems Command, Washington, DC
U.S. Marine Corps, Research, Development and Acquisition Command, Quantico, VA

ACTIVITIES VISITED OR CONTACTED (CONT'D)

Non-Government Activities

Bowen McLaughlin York Corporation, York, PA
AM General Corporation, Livonia, MI
Pacific Car and Foundry Corporation, Renton, WA
Cummins Engine Company, Columbus, IN

AUDIT TEAM MEMBERS

Donald Reed, Director
John Dillinger, Program Director
Ronald Mazurik, Project Manager
Jose Delino, Auditor
Edward LaBelle, Auditor
Delpha Martin, Auditor
Jim Wells, Auditor
Lawrence Heller, Auditor
Joe Mislan, Engineer
David Leising, Contract Specialist
William Fox, Industrial Specialist

FINAL REPORT DISTRIBUTION

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Comptroller of the Department of Defense
Director, Operational Test and Evaluation

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Assistant Secretary of the Army (Financial Management)
Assistant Secretary of the Army (Research, Development and Acquisition)
Commander, U.S. Army Materiel Command
Commander, U.S. Army Tank-Automotive Command
Program Executive Officer for Heavy Force Modernization

Department of the Navy

Secretary of the Navy
Assistant Secretary of the Navy (Financial Management)
U.S. Marine Corps, Research, Development and Acquisition Command, Quantico, VA

Other Defense Activities

Director, Defense Logistics Agency

Other

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