Audit Report

OFFICE OF THE INSPECTOR GENERAL

TRANSPORTABILITY OF MAJOR WEAPON AND SUPPORT SYSTEMS

Report No. 94-024

December 27, 1993

Department of Defense

Acronyms

AFMC	Air Force Materiel Command
AGS	Armored Gun System
ATTLA	Air Transportability Test Loading Agency
DLA	Defense Logistics Agency
JSIPS	Joint Services Imagery Processing System
LVAD	Low Velocity Airdrop
MTMC	Military Traffic Management Command
PEO	Program Executive Office
TACOM	Tank and Automotive Command
TEMP	Test and Evaluation Master Plan
TRANSCOM	U.S. Transportation Command

INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
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ARLINGTON, VIRGINIA 22202-2884

December 27, 1993

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND TECHNOLOGY
DEPUTY UNDER SECRETARY OF DEFENSE FOR LOGISTICS
ASSISTANT SECRETARY OF THE AIR FORCE (FINANCIAL MANAGEMENT AND COMPTROLLER)
AUDITOR GENERAL, DEPARTMENT OF THE ARMY
COMMANDER IN CHIEF, U.S. SPECIAL OPERATIONS COMMAND

SUBJECT: Audit Report on the Transportability of Major Weapon and Support Systems (Report No. 94-024)

We are providing this report for your review and comment. The audit was requested by the then Office of the Assistant Secretary of Defense (Production and Logistics). Comments on a draft of this report were considered in preparing the final report.

DoD Directive 7650.3 requires that all recommendations be resolved promptly. Therefore, we request that the Deputy Under Secretary of Defense (Logistics), the Army, the Air Force, and the U.S. Special Operations Command, provide comments on the unresolved recommendations, the monetary benefits, and the internal control weakness by February 25, 1994. See the "Response Requirements for Each Recommendation" section at the end of the finding for recommendations requiring comments.

The cooperation and courtesies extended to the audit staff are appreciated. If you have any questions on this audit, please contact Mr. Jack Gebka at (703) 692-3303 (DSN 222-3303) or Mr. Darrell Eminhizer at (703) 614-6299 (DSN 224-6299). The distribution of this report is in Appendix H.

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Office of the Inspector General, DoD

Report No. 94-024 December 27, 1993
Project No. 2LC-5023

TRANSPORTABILITY OF MAJOR WEAPON AND SUPPORT SYSTEMS

EXECUTIVE SUMMARY

Introduction. Within DoD, transportability is the keystone of strategic mobility and rapid deployment. Transportability is the inherent capability of material and unit equipment to be efficiently moved by existing or planned transportation assets. Transportability considerations for major weapon systems should begin during concept exploration, and transportability requirements are to be met by milestone III of the acquisition process. DoD has about 122 major weapon and support system programs in various stages of the acquisition process. Major weapon and support systems will have less value to DoD if they cannot be efficiently transported when needed. This audit was requested by the then Office of the Assistant Secretary of Defense (Production and Logistics).

Objectives. Our objective was to determine if the Military Departments were effectively considering transportability factors during the acquisition of major weapon and support systems. We also evaluated the effectiveness of related internal controls.

Audit Results. Transportability of systems was not being adequately considered during the acquisition of the three major weapon and support systems valued at $2.2 billion. There was no single DoD organization accountable for ensuring the transportability of weapons systems although at least 20 different organizations were involved. As a result, the Army was planning to buy 58 Armored Gun Systems, at a cost of about $186 million, which had a design that was too heavy to be low velocity airdropped from a C-130 aircraft; the Services were overloading tactical shelters and were using modified trailers for the Joint Services Imagery Processing System that had not completed transportability tests and were paying additional shelter costs of about $1.6 million; and the Army and Air Force were planning to retrofit Black Hawk helicopters at a cost of about $4.8 million without validating that the modified helicopters were air transportable.

Internal Controls. Army, Air Force, and DoD controls were insufficient to ensure that program managers met transportability requirements of major weapon and support systems before contracts were awarded for initial low rate production or major modification. These were material internal control weaknesses. See Part I for a description of the controls assessed and Part II for details of the weakness.

Potential Benefits of Audit. We identified potential monetary benefits of about $192 million, of which $190.4 million will occur only if the Armored Gun System and modified Black Hawk helicopters cannot meet air transportability requirements. We also identified nonquantifiable monetary benefits that will improve transportability planning during the acquisition process (see Appendix E).

Summary of Recommendations. We recommended that DoD Directive 5158.4 be revised to make the U.S. Transportation Command responsible for transportability certification; DoD Directive 4510.XX be promptly issued to establish policy needed to

support the issuance and implementation of the revised Joint Transportability Regulation; DoD Instruction 5000.2 be revised to require that systems meet transportability requirements before low rate production or major modification; the Armored Gun System procurement be reduced if airdrop mission requirements are not met; the transportability and procurement of Joint Services Imagery Processing Systems shelters and trailers be coordinated with designated DoD authorities; loading plans be approved by the Air Force's Air Transportability Test Loading Agency for the reconfigured MH-60K helicopter; and Pave Hawk helicopter transportability in a C-141 aircraft be determined before retrofitting the helicopter.

Management Comments. The Deputy Under Secretary of Defense (Logistics) disagreed that DoD Directive 5158.4 be revised because transportability was a service responsibility. The Deputy Under Secretary agreed that transportability roles, responsibilities, and certification processes should be clarified but stated that the Joint Regulation (Army Regulation 70-44, Office of the Chief of Naval Operations 4600.22B, Air Force Regulation 80-18, Marine Corps Order 4610.14C, and Defense Logistics Agency Regulation 4500.25) should be the document for clarifying the certification process. The Deputy Under Secretary also agreed to revise DoD Instruction 5000.2. The Army agreed to successfully airdrop the Armored Gun System from a C-130 aircraft before procurement of initial Armored Gun Systems for low rate production and to verify that the Joint Services Imagery Processing System trailers can safely transport the modified and overloaded shelters and that the trailers be logistically supported. The Air Force agreed to verify that modified shelters can safely transport the Joint Services Imagery Processing System but disagreed that the additional shelters should be purchased by the Air Force Shelter Management Office. The Air Force disagreed with the potential monetary benefits of about $1.6 million stating that savings of procuring an "identical" shelter would be offset by the "schedule/performance" risk. The U.S. Special Operations Command disagreed that loading plans be developed for the reconfigured MH-60K helicopter and disagreed with the potential monetary benefits of about $350,000. The Air Force agreed to cancel plans to retrofit the Pave Hawk helicopter until transportability in a C-141 aircraft was determined. Part II contains a complete discussion of managements' comments to the report; and Part IV contains the complete text of managements' comments.

Audit Response. We disagree with management comments on the recommendation that transportability should solely be a Service responsibility. U.S. Transportation Command's independence in certifying transportability will help ensure that management controls are enforced. We revised the recommendation that DoD Directive 4510.XX be issued promptly to clarify transportability roles and responsibilities, including those of the U.S. Transportation Command, and to establish the DoD policy needed to support issuance and implementation of the Joint Regulation. The position of the Air Force to not purchase additional standard shelters is nonresponsive to the intent of our recommendation. The recommendation does not direct the Joint Services Imagery Processing System program manager to procure DoD standard shelters, but it is intended to ensure that the Shelter Management Office assist in the most economical procurement of needed shelters. The intent of the recommendation on loading plans for the reconfigured Black Hawk helicopter is to ensure that loading plans are developed for the reconfigured helicopter to meet its transportability requirements.

We request that the Deputy Under Secretary of Defense (Logistics), the Army Office of the Deputy Chief of Staff for Logistics, the Air Force Deputy Chief of Staff (Logistics), and the U.S. Special Operations Command respond to the unresolved issues in this final report by February 25, 1994.

Table of Contents

Executive Summary i

Part I - Introduction 1

Background 2
Objectives 2
Scope 3
Internal Controls 3
Prior Audits and Other Reviews 3

Part II - Finding and Recommendations 5

Transportability 6

Part III - Additional Information 31

Appendix A. Profile of Systems Reviewed 32
Appendix B. DoD Acquisition and Transportability Guidance Revisions 36
Appendix C. Transportability Activities and Their Responsibilities 37
Appendix D. DoD Airlift Resources 40
Appendix E. Audit Responses to Specific Management Comments 41
Appendix F. Summary of Potential Benefits Resulting from Audit 49
Appendix G. Organizations Visited or Contacted 51
Appendix H. Report Distribution 53

Part IV - Management Comments 55

Deputy Under Secretary of Defense (Logistics) Comments 56
Office of the Assistant Secretary of the Army (Research, Development, and Acquisition)
Department of the Army, Product Manager, Special Operations Aircraft
Office of the Assistant Secretary of the Air Force (Acquisition)
Department of the Army Office of the Deputy Chief of Staff for Logistics Comments 83
Department of the Air Force Deputy Chief of Staff (Logistics) Comments 88
Joint Services Imagery Processing System Program Manager
Deputy Commander in Chief of the United States Special Operations Command Comments 98

This report was prepared by the Logistics Support Directorate, Office of the Assistant Inspector General for Auditing, Department of Defense. Copies of the report can be obtained from the Secondary Reports Distribution Unit, Audit Planning and Technical Support Directorate (703) 614-6303 (DSN 224-6303).

Part I - Introduction

Background

Within DoD, transportability is the keystone of strategic mobility and rapid deployment. Transportability is the inherent capability of material and unit equipment to be efficiently moved by highway, rail, waterway, ocean, and air. The Secretary of Defense's 1993 Annual Report to the President and Congress states that our ability to deploy forces rapidly in the future will be crucial. The report states that U.S. Armed Forces must anticipate a wider range of contingencies in more distant and possibly less developed regions of the world. Additionally, as fewer U.S. Armed Forces are likely to be stationed overseas in the future, our nation will be faced with the deployment challenges of reaching trouble spots worldwide from the home base.

DoD has 122 major weapon systems programs and support systems, to include specialized electronics and transportation equipment, in various stages of the acquisition process. For rapid deployment, the weapon and support systems should fit into available or planned transportation modes, be compatible with material handling equipment, and able to be transported with limited disassembly. The Under Secretary of Defense for Acquisition establishes overall policies and procedures for weapon system design to ensure efficient and economical movement of weapon systems and equipment.

The acquisition process consists of five major milestones (milestone 0 - concept studies approval, milestone I - concept demonstration approval, milestone II - development approval, milestone III - production approval, and milestone IV - major modification approval). An acquisition phase occurs after each milestone (phase 0 - concept exploration and definition, phase I - demonstration and validation, phase II - engineering and manufacturing development, phase III - production and deployment, and phase IV - operations and support). Milestone II usually involves a commitment to low rate initial production, in which systems are produced in limited quantity to demonstrate a production line capability, provide representative systems for operational test and evaluation, and permit an orderly increase into full-rate production.

Objectives

The overall audit objective was to determine if the Military Departments were effectively considering transportability factors during the acquisition of major weapon and support systems. We also assessed applicable internal controls.

Scope

Of the 122 major weapon and support systems being procured during FY 1992, we judgmentally selected 3 systems for review, the Armored Gun System (AGS), Joint Services Imagery Processing System (JSIPS), and modified Black Hawk helicopters (MH-60K and Pave Hawk). A description of the systems is provided in Appendix A. We reviewed and evaluated management's process of assessing transportability during the acquisition process, the roles and responsibilities of the offices involved in the transportability approval process, and the transportability evaluations prepared by the appropriate transportability agencies. We also compared transportability requirements with the capabilities of the systems being procured from the contractors, and the capabilities of related transportability support equipment.

This audit was requested by the then Office of the Assistant Secretary of Defense (Production and Logistics). This economy and efficiency audit was made from March 1992 to June 1993, in accordance with auditing standards issued by the Comptroller General of the United States as implemented by the Inspector General, DoD. We also evaluated the applicable internal controls. Organizations visited or contacted during the audit are in Appendix G.

Internal Controls

The audit identified material internal control weaknesses as defined by Public Law 97-255, Office of Management and Budget Circular A-123, and DoD Directive 5010.38. Internal control policy guidance and procedures were generally insufficient to ensure that program managers met transportation requirements before low rate initial production award or award for major modification of systems. Recommendations 1. and 2. in this report, if implemented, will correct the weaknesses. Monetary benefits of about $192 million are related to our other recommendations which are discussed in Appendix F; however, those recommendations pertain to program adjustments needed because of transportability problems, not the correction of internal control weaknesses. A copy of the final report will be provided to the senior officials responsible for internal controls within the Office of the Secretary of Defense, the Army, and the Air Force.

Prior Audits and Other Reviews

There has been no audit coverage in the last 5 years directly related to transportability of major weapon and support systems.

Part II - Finding and Recommendations

Transportability

DoD program managers were not adequately considering the transportability of major weapon and support systems during the acquisition process for the three systems we reviewed. Nonconsideration of transportability occurred because policy guidance had not been issued to clearly define roles, oversight responsibilities, and procedures related to transportability approval and certification. Additionally, adequate internal controls had not been established to ensure that program managers met transportability requirements before contracts were awarded for low rate initial production or major modification of major weapon and support systems. About $186 million could be spent for 58 Armored Gun System vehicles without ensuring that the Armored Gun System can be low velocity airdropped from a C-130 aircraft; about $1.6 million could be spent for overloaded tactical shelters for the Joint Services Imagery Processing System with modified trailers that have not completed transportability tests; and about $4.8 million may be spent to retrofit modified Black Hawk helicopters without first determining if the modified helicopters meet air transportability requirements.

Background

In February 1991, the Deputy Secretary of Defense revised DoD Directive 5000.1, "Major and Non-Major Defense Acquisition Programs," to streamline the acquisition process. DoD Instruction 5000.2, "Defense Acquisition Program Procedures," was revised in February 1991 by the Under Secretary of Defense for Acquisition and the Director of Operational Test and Evaluation to implement the policies set forth in DoD Directive 5000.1. The Under Secretary of Defense for Acquisition and Technology is responsible for implementing all procedures stated in DoD Instruction 5000.2 except those pertaining to Operational Test and Evaluation.

DoD Instruction 5000.2 states that transportability engineering efforts will identify the characteristics that limit transportation of major weapon and support systems. Management will use that data when considering the design of new and modified equipment in order to effectively transport the equipment. The Instruction further states that transportability is one of ten integrated logistics support elements to be considered at milestone decision points. The Instruction requires that transportability approval should be given by the appropriate transportability activity before production milestone III decisions are made, and that strategic mobility requirements be demonstrated where relevant.

Transportability Roles and Responsibilities

Streamlined acquisition guidance has made transportability roles and oversight responsibilities unclear. Previous guidance identified a focal point within each Service, responsible for ensuring that transportability was fully considered during the acquisition process. Additionally, the lack of regulations to implement revised DoD Directive 5000.1 and DoD Instruction 5000.2 have made transportability roles, oversight responsibilities, and certification procedures unclear. A summary of DoD acquisition and transportability guidance revisions is shown in Appendix B.

Streamlined acquisition guidance and transportation guidance did not identify a focal point within the Services or Unified Commands with the responsibility and authority for ensuring the full consideration of transportability of weapon systems. DoD issued DoD Directive 5158.4, "United States Transportation Command," January 8, 1993, making the U.S. Transportation Command (TRANSCOM) responsible for providing air, land, and sea transportation for DoD during peace and war. When deployment occurs, TRANSCOM will be responsible for transporting systems to meet its mission needs. However, TRANSCOM did not have adequate authority in the acquisition process (DoD Instruction 5000.2) to ensure that program managers were meeting the transportability requirements of the systems. TRANSCOM was indirectly associated with the transportability needs of new and modified weapon and support systems through its component commands - Military Traffic Management Command (MTMC), Military Sealift Command, and Air Mobility Command. Some transportation engineering activities directly involved in ensuring that transportability requirements were met were not within TRANSCOM's purview. For instance, the Air Transportability Test Loading Agency (ATTLA) certifies air transportability for weapon and support systems in fixed wing aircraft. However, ATTLA is under the Air Force Materiel Command (AFMC), not under TRANSCOM. Therefore, no single DoD organization was being held accountable for ensuring that air transportability requirements of major weapon and support systems were being met.

DoD transportability roles and oversight responsibilities have not been clearly defined to implement the revisions to DoD's acquisition process. At the time of audit, DoD had at least 20 organizations, primarily transportation engineering activities, involved in various aspects of ensuring that DoD could efficiently and effectively transport major weapon and support systems (see Appendix C). The organizations were established to implement transportability policy; assess the effectiveness of transportation policy, programs, and systems; provide adequate transportation resources; certify whether a system can be airlifted internally, airlifted externally, airdropped, sealifted, or transported by land as required; provide transportability approvals; and ensure that effective shelters or trailers are efficiently provided. Although these organizations have transportability engineering and approval missions, DoD Instruction 5000.2 does not require that program managers utilize their services during the acquisition of major weapon and support systems. As a result, the organizations did not have the authority to hold program managers accountable to meet transportability requirements during the acquisition process.

The then Assistant Secretary of Defense (Production and Logistics) and the Services drafted implementing procedures for DoD Instruction 5000.2; however, the procedures have not been approved or implemented, and they are insufficient. Since the Spring of 1989, the then Office of the Assistant Secretary of Defense (Production and Logistics) coordinated within the Office of the Secretary of Defense and with the Services on draft DoD Directive 4510.XX, "Defense Transportation Engineering." The purpose of the draft Directive is to establish policy, assign responsibilities, and prescribe procedures to incorporate effective transportability engineering procedures into DoD weapon and support systems. The draft DoD Directive 4510.XX is insufficient because it does not clearly identify transportability roles, responsibilities, and the approval process for obtaining transportability certifications during the acquisition of major weapon and support systems. At the time of audit, the Office of the Assistant Secretary estimated that the Directive would be published by May 1994.

The Services were updating a joint regulation, Army Regulation 70-44, Office of the Chief of Naval Operations Instruction 4600.22B, Air Force Regulation 80-18, Marine Corps Order 4610.14C, and Defense Logistics Agency (DLA) Regulation 4500.25, "Research and Development, DoD Engineering for Transportability." The purpose of the joint regulation is to provide policy, assign responsibilities, identify transportability agents, and prescribe procedures for the Services and DLA's program managers to follow during the acquisition process to ensure that weapon and support systems are transportable. After the final DoD Directive 4510.XX is issued, the Services plan to distribute the draft joint regulation for comment. Transportability roles, responsibilities, and approval procedures listed in the joint transportability regulation will be based on procedures outlined in DoD Directive 4510.XX.

Transportability must be considered during the acquisition process to ensure that the weapon systems being procured, as well as specialized electronics and transportation equipment, are capable of efficient transport. DoD Instruction 5000.2 has created uncertainty regarding who is to ensure transportability and how transportability requirements are to be met. Additionally, the Instruction only requires that transportability requirements be met before proceeding into milestone III, production approval. Adequate safeguards do not exist in the acquisition process to ensure that transportability requirements are met before a system proceeds into low rate initial production or major modification.

Crucial transportation needs may not be met in a time when deployability needs in DoD are increasing. Under DoD's streamlined acquisition process, transportability requirements, a critical element in the acquisition process, were not effectively met for the three systems audited, which have an estimated acquisition cost of $2.2 billion. The program managers for the audited systems were not adequately considering the transportability of the systems during the acquisition process. As a result, DoD's ability to deploy the systems is unnecessarily placed at risk, and DoD could unnecessarily spend about $192 million on the systems.

Armored Gun System The Army was planning to buy 58 AGS in late 1994, at a cost of about $186 million. However, it had not achieved a design that would make the AGS capable of being low velocity airdropped (LVAD) from available tactical aircraft. Acquisition guidance did not provide adequate internal controls to ensure that the AGS will meet the LVAD requirement from available tactical aircraft before the system proceeds into low rate initial production. As a result, the Army plans to spend about $186 million procuring 58 AGS vehicles that may not meet mission needs because they are too heavy to be airdropped.

Procurement Status. The AGS is in the engineering and manufacturing development phase. The milestone II approval for entry into the engineering and manufacturing development phase of the acquisition process was given in May 1992. In June 1992, the prime contractor was awarded a contract for the development of six prototype vehicles, at an award amount of about $119 million. A low rate initial production contract for an additional 69 vehicles costing about $222 million is scheduled to be awarded in December 1994. The AGS full rate production decision is scheduled for December 1997. The planned AGS procurement is 300 vehicles, of which 58 will be used for LVAD missions.

LVAD Requirement. Under DoD Instruction 5000.2, the AGS Program Executive Office (PEO) does not have to receive air transportability certification for LVAD requirements prior to its award of the low rate initial production contract. Airdrop is a transport procedure in which personnel or materiel are unloaded in flight. Materiel is secured onto a platform with restraints and is extracted from an aircraft by extraction parachutes. Recovery parachutes attached to the platform load slow the rate of descent. LVAD is a type of airdrop in which personnel or materiel are extracted at an altitude of 700 feet or higher to descend at a rate of less than 28.5 feet per second. The C-130 aircraft is the only tactical aircraft used for LVAD operations. The C-17 aircraft, when developed, will be capable of tactical LVAD missions, but will operate primarily in a strategic role. The C-141 and C-5 aircraft are capable of LVAD missions, but are designated as strategic aircraft, not tactical aircraft. Additionally, the C-141 aircraft cannot LVAD as much weight as the C-130 aircraft unless a waiver is obtained. The prime contractor for the AGS has committed, during prototype development, to develop an AGS capable of a C-130 and C-17 LVAD. A summary of DoD cargo aircraft resources is in Appendix D.

Of the 300 planned AGS vehicles, 58 are scheduled to be delivered to the XVIII Airborne Corps, which has an essential need for a C-130 LVAD capability to support contingency operations. The XVIII Airborne Corps is the first scheduled user to receive the AGS vehicles. The M551A1 Sheridan assault vehicle met the XVIII Airborne Corps' C-130 LVAD requirement, but it lacked the needed firepower and survivability.

AGS Weight. As designed, the AGS is too heavy to perform a LVAD from the C-130 aircraft. The estimated total weight of the vehicle has been a concern since market surveys were conducted before the prototype contract award. Initial market surveys revealed that few potential contractors

had the capability of developing a system within the C-130 LVAD weight constraints, including the contractor who was eventually awarded the AGS prototype contract. Since the award of the prototype contract, the estimated AGS design weight has increased from about 900 to about 1,200 pounds over the C-130 LVAD item weight limit of 35,500 pounds. Although the PEO has target weight reductions, officials at the Army Natick Research, Development, and Engineering Center, which certifies equipment for airdrop, stated that the AGS would probably grow in weight because of modifications or the need to airdrop with increased fuel and ammunition. Additionally, officials at MTMC Transportation Engineering Agency, which conducts transportability analysis, stated that the weight of the C-130 LVAD AGS remained an important issue and recommended that the PEO conduct at least one successful C-130 LVAD before low rate initial production award for the AGS.

C-17 Aircraft Availability. Concern existed over the capability and availability of the C-17 aircraft to perform tactical LVAD missions. The Army Training and Doctrine Command's study on C-17 airdrop operations found that the C-17 aircraft capability may be limited because of the reduced planned C-17 procurement. The C-17 planned procurement had been reduced from 210 to 120 aircraft since the program's inception and in December 1993 the Secretary of Defense limited the actual acquisition to 40 aircraft unless critical requirements were met by 1995. Personnel at the Army Natick Research, Development, and Engineering Center stated that airdrop deployability would be limited if the C-17 was the only aircraft capable and available to support airdrop operations. Further, in a transportability criteria report, the contractor for the AGS stated that skepticism existed in accepting the C-17 for tactical missions because of the limited availability of C-17 aircraft.

Internal Control Weakness. DoD Instruction 5000.2 lacks adequate safeguards for ensuring that the AGS meets the C-130 aircraft LVAD requirement. The Instruction does not require that transportability needs be met before systems proceed into low rate initial production award. Although the C-130 LVAD requirement was included in the AGS contract, the PEO was not scheduled to receive transportability certification for the AGS before low rate initial production award, and did not specifically schedule a C-130 LVAD test to support the decision in the AGS test and evaluation master plan. Acquisition guidance should require that specific system requirements, to include transportability, be successfully demonstrated prior to entering low rate initial production award. Otherwise, DoD may expend significant funds during low rate initial production for systems that cannot meet transportability requirements. For the AGS, the DoD acquisition process did not provide adequate management controls to ensure that about $186 million would not be spent procuring 58 systems that could not meet the mission needs of the XVIII Airborne Corps.

Joint Services Imagery Processing System (JSIPS) JSIPS program managers procured, modified, and overloaded tactical shelters and modified trailers without coordinating with the DoD organizations responsible for ensuring shelter and trailer transportability. JSIPS program managers did not comply with the applicable guidance that directs the coordination of such procurements and modifications because adequate management oversight had

not been established to ensure that the guidance was followed. Transportability roles, responsibilities, and certification approval were inadequate to ensure that the JSIPS program managers complied with transportability requirements during the acquisition of JSIPS. As a result, the transportability of the JSIPS may have been unnecessarily placed at risk and the ability of JSIPS users to maintain and replace the modified shelters and trailers would be more difficult. Further, the procurement of additional tactical shelters through the prime contractor may unnecessarily increase costs by about $1.6 million.

Procurement Status. The JSIPS was in engineering and manufacturing development. Two engineering and manufacturing development models have been procured. The Air Force, the lead Service, approved low rate initial production in February 1993. The Army and Marine Corps have programmed production funds in 1995, and the Navy in 1996. The Services were planning to procure 24 JSIPS units (3 for the Army, 15 for the Navy, 2 for the Air Force, and 4 for the Marine Corps), at an estimated cost of $674 million.

Shelters. The Army, Air Force, and Marine Corps were planning to place nine JSIPS units in tactical shelters. The Navy was planning to integrate the remaining 15 JSIPS units on board ships, which would not involve the use of tactical shelters. Tactical shelters are used to protect personnel and delicate equipment from environmental damage and the effects of a combat zone while doing mission essential activities. In addition to the 8 shelters procured during engineering and manufacturing development, the Services were planning to acquire 28 additional shelters. The JSIPS will use two different size tactical shelters. The Marine Corps will use 16, 8 by 8 by 10 foot shelters; and the Army and Air Force will use 20, 8 by 8 by 20 foot shelters.

Modification of Shelters. During development, the JSIPS program manager procured and modified eight tactical shelters through the JSIPS prime contractor without contacting the Air Force Shelter Management Office, as required. The program manager for the JSIPS was planning to procure the remaining 28 shelters during both low rate initial and full production without coordinating with the shelter office. Under DoD Instruction 5000.2, the JSIPS program manager does not have to obtain transportability approval prior to award of the low rate initial production contract. Additionally, adequate management oversight was not in place to preclude the program manager from entering production before transportability requirements were met.

DoD Instruction 5000.2, section E, "Transportability," states that specific emphasis will be placed on the design or modification of shelters to ensure that they conform to dimensional and strength specifications as prescribed by DoD Directive 4500.37, "Management of the DoD Intermodal Container System," April 2, 1987. DoD Directive 4500.37 requires that programs needing tactical shelter use only shelters of the DoD standard family of tactical shelters. If a nonstandard tactical shelter is needed, a request for waiver must be submitted through the Joint Committee on Tactical Shelters, which is made up of representatives from each of the Military Departments' shelter offices.

In the Air Force, the Air Force Shelter Management Office is assigned the responsibility and authority for development and acquisition of shelters when new or modified shelters are required. Air Force Regulation 800-3C2, "Acquisition Management Engineering for Defense Systems," June 27, 1980, states that all program offices with requirements for tactical shelters, to support system mobility, will identify their needs to the Air Force Shelter Office, Electronic Systems Center. Air Force Regulation 800-3C2 further states that program funds for tactical shelter development or acquisition will not be committed until the shelter management office has reviewed proposed efforts and AFMC has approved them. The shelter management office has the responsibility to identify and eliminate weaknesses in shelter design and in construction and materials that affect life cycle cost, performance, reliability, and maintainability.

Cost of Shelters. The JSIPS program manager procured eight modified shelters, four 10 foot and four 20 foot shelters through the prime contractor. The prime contractor charged DoD an estimated $2.9 million for the eight shelters. The Air Force Shelter Management Office could have procured the eight shelters for about $900,000 from the Army's item manager for shelters, Aviation Troop Support Command, at a savings of about $2 million.

In addition to the eight modified shelters, the JSIPS program manager planned to procure 28 additional shelters. If the prime contractor were permitted to acquire the shelters the total estimated cost would be $4.2 million versus $2.6 million if a military item manager procured the shelters. JSIPS could potentially avoid $1.6 million in costs for the planned acquisition of shelters by obtaining the shelters through the military item manager for shelters.

Overloading of Shelters. The JSIPS tactical shelters were modified and overloaded without adequate coordination with the Air Force Shelter Management Office. DoD's stated gross weight capacity for a 10-foot shelter is 6,170 pounds. However, the JSIPS program manager loaded the modified standard shelters with equipment, which raised the gross weight to an average of 9,008 pounds (46 percent greater than the stated DoD capacity). The DoD stated gross weight capacity for the 20-foot shelter is 11,180 pounds. However, the JSIPS program manager modified and loaded the shelters with equipment, which raised the gross weight to an average of 17,748 pounds (61 percent greater than the stated DoD capacity). The overloading of the tactical shelter without coordination with the Air Force Shelter Management Office placed the successful transportation of the $674 million JSIPS program at risk; because the Air Force Shelter Management Office had not evaluated the structural integrity of the modified shelters to ensure that the shelters met the transportability needs of JSIPS. Additionally, the modified nonstandard shelters had not been evaluated to ensure that they could be adequately maintained or replaced as needed. Ground transportation for JSIPS shelters is to be provided by semi-trailers, dolly sets (easily attachable or detachable wheel sets), and 5-ton trucks.

Trailers. The Army program manager for JSIPS, the Army Space Program Office, significantly modified five military standard M871A1

semi-trailers without coordinating the changes with the trailer manager, the Army Tank and Automotive Command (TACOM). TACOM has full responsibility for configuration management control over the M871A1 trailer to ensure that supportability and readiness of the trailer is maintained. The Army program manager for JSIPS had coordinated with TACOM in selecting the standard M871A1 trailer, however, a subsequent TACOM tractor modification caused the system to exceed a contract height specification. To solve the height problem, the Army program manager for JSIPS authorized an independent contractor to modify the trailer. The independent contractor severed the trailer at about a quarter of the distance from the trailer's front end. The front quarter of the trailer was then raised to a plane of about 9 inches higher than the rear three quarters of the trailer as shown in Illustration 1.

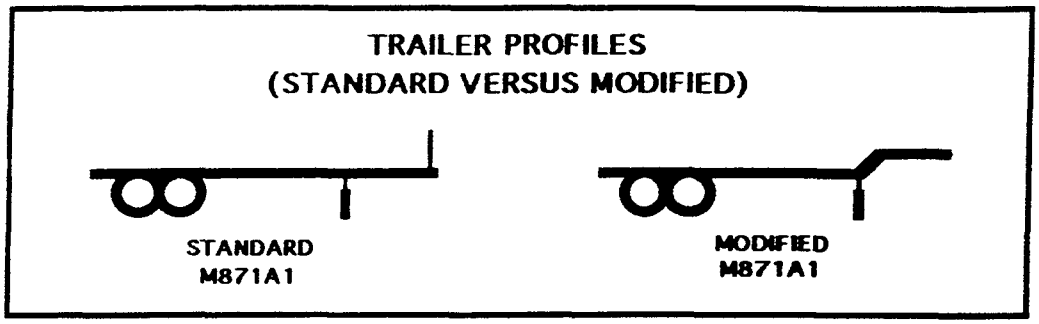


Illustration 1.

Without the trailer modification, the combination of trailer, tractor, and shelter would have exceeded a 4-meter European height limit that was needed for maximum mobility on European roads without special routing. The trailer modifications were needed to keep the trailer bed relatively level when combined with the tractor as shown in Illustration 2.

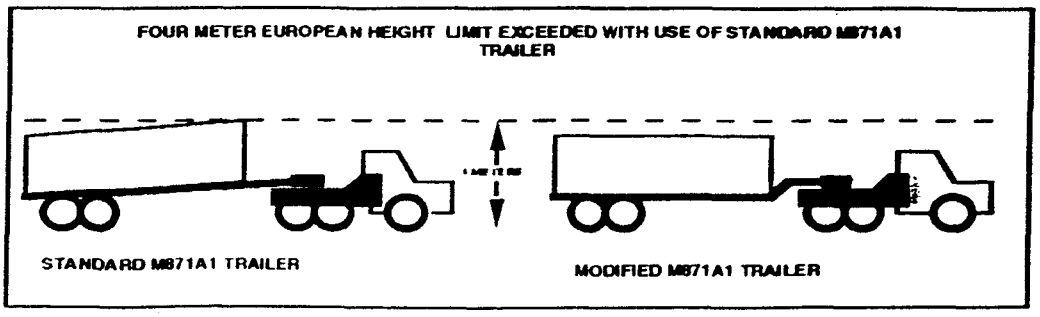


Illustration 2.

Adequate coordination between the Army program manager and the TACOM office responsible for trailers did not occur. The Army JSIPS program manager should have coordinated with TACOM to ensure that trailers were fully tested and could be logistically supported to fully meet JSIPS transportability needs. Officials from the Army program manager's office stated that they had the authority to modify the M871A1 trailer without coordination with the trailer manager, TACOM. They noted that special authorizations permitted avoiding some rules, which expedited the JSIPS when time was critical. The JSIPS Program Management Directive, as referenced by the program manager, stated that within legal limits, JSIPS will use expedited contracting to support the time urgency and security involved. The Directive also stated that the project officer is authorized to deviate from or modify appropriate DoD and Service regulations to accomplish the objectives of the Program Management Directive, providing the deviations are consistent with applicable statutes and Executive Orders, and are agreed to by the Services. Despite the Army program manager's statements, the JSIPS had over 2 years, from the time the need for modification was first identified to the time the Army program manager contracted for the modifications. Additionally, the need for deviation from established procedures was not justified because the program manager had previously coordinated with TACOM in the selection of the original trailer to be used to transport JSIPS.

Internal Controls. Adequate management oversight had not been established to ensure that JSIPS program managers complied with transportability requirements during the acquisition of JSIPS. DoD Instruction 5000.2 did not require that specific system requirements, to include transportability, be successfully demonstrated before low rate initial production contract award. Although guidance exists requiring the coordination of both trailer modification and shelter procurement, adequate management controls did not exist to ensure that guidance was followed during the acquisition of JSIPS. As a result, transportability of the JSIPS was unnecessarily placed at risk, the ability of the JSIPS users to maintain and replace the modified trailers and shelters was made more difficult, and procurement of JSIPS tactical shelters through the prime contractor could unnecessarily increase costs by about $1.6 million.

Modified Black Hawk Helicopters. The Army and Air Force program managers made major modifications to Black Hawk helicopters without ensuring the air transportability of the modified helicopters. Adequate controls were not built into the acquisition process to preclude production of the modified helicopters before their air transportability requirements were met. Program managers did not coordinate or obtain needed certifications from appropriate transportability agencies before proceeding with production of the modified helicopters. As a result, the Army and Air Force may have to spend about $4.8 million to retrofit the modified Black Hawk helicopters to meet air transportability requirements.

Procurement Status. The Army MH-60K and Air Force Pave Hawk are highly modified variants of the Army Black Hawk helicopter; and their air transportability characteristics are different from the Black Hawk

helicopter. The helicopters were modified to fulfill an Army and Air Force critical need for long-range air extraction of downed crew members and equipment.

The Army MH-60K helicopter is in the production phase. At the time of audit, 10 helicopters had been produced, and 13 were planned for completion by May 1994. U. S. Army Special Operations Command, Special Operations Aircraft Product Manager is responsible for modifying 23 Black Hawk helicopters, at an estimated cost of $548 million, for the Army Special Operations Command.

The Air Force Pave Hawk helicopter program is also in the production phase. At the time of audit, 56 Pave Hawk helicopters had been produced, and 41 were in various stages of production. The AFMC, Warner Robins Air Logistics Center, is the program manager responsible for modifying 97 Black Hawk helicopters at an estimated cost of $838 million. The Pave Hawk helicopter is assigned to an Air Force Special Operations Command unit and 14 Air Force active duty, guard, and reserve combat search and rescue units.

MH-60K Transportability. The Army MH-60K program manager modified the Black Hawk helicopters without ensuring that the helicopters could meet the Army's C-5 aircraft loading requirements. The Army MH-60K program manager installed an aerial refueling probe system and antennas on the MH-60K helicopters. The modifications reduced the maximum number of MH-60K helicopters that could be loaded in a C-5 aircraft from six to five and increased the time required to load C-5 aircraft. The Army's MH-60K program transportability requirements state that the helicopter shall be transportable by C-5 aircraft and that the number of MH-60Ks to be transported by Air Force cargo aircraft shall be maximized. Additionally, the MH-60K contractual transportability requirements specify that the helicopter must be capable of being prepared for loading on a C-5 aircraft within 1 hour and ready for operation within 1 1/2 hours after transport.

C-5 Aircraft Loading. The program manager for the MH-60K did not have the maximum loading capacity determined and certified by ATTLA, an AFMC activity, before production; and the prime contractor did not meet the contractually required disassembly time for C-5 transport. ATTLA is the approval authority for major weapon and support systems to be transported in Air Force aircraft. ATTLA responsibilities include developing transportation guidance, tiedown, loading and unloading procedures for the most efficient air movement of systems. ATTLA has detailed procedures for conducting maximum density tests loadings to determine the most efficient use of aircraft space. The MH-60K program manager relied on previous test loadings of the Black Hawk helicopter to determine the maximum number of MH-60K helicopters that could be loaded on a C-5 aircraft. Previous test loadings that ATTLA performed on an unmodified Black Hawk determined that six was the maximum number of helicopters that could be safely and efficiently loaded on a C-5 aircraft.

In April 1992, the program manager, in coordination with ATTLA and the Army Special Operations Command, attempted to test load the MH-60K

helicopter on a C-5 aircraft. The test loading occurred 10 months after the program manager had awarded the prime contractor a modification contract to produce 11 MH-60K helicopters. Review of test loading data showed that a serious fuel leak spill occurred when the external tank system and the in-flight refueling boom were removed. The time and disruption caused by attempting to contain and subsequently clean up the spill resulted in an unacceptable delay in the disassembly process. Another obstacle in meeting the MH-60K loading requirements was an antenna mounted on the tail boom. The support equipment, used to tow the MH-60K tail first into a C-5 aircraft, interfered with the antenna mounted on the tail boom. The inability to load the MH-60K tail first and the need to safely and quickly remove the fuel probe and external fuel tanks on the MH-60K reduced the maximum C-5 load capacity to five helicopters and exceeded the contractually required disassembly time needed to load MH-60Ks on a C-5 aircraft.

MH-60K Planned Retrofits. Officials at the Army MH-60K program manager's office stated that limiting the loading on C-5 aircraft to five MH-60Ks was unacceptable and that removing the antenna before loading was also unacceptable from both a maintenance and operational perspective. To meet MH-60K transportability requirements, the Army planned to perform retrofits to the helicopters to correct the fuel leakage problem. The MH-60K program manager planned to install quick disconnects to the refueling probe and external fuel tanks. The quick disconnects are connector fittings attached to the external tank and the refueling probe lines that allow for easier removal and installation of the refueling probe and external fuel tanks. The preliminary estimate to install the quick disconnects on the external fuel tanks of the 23 MH-60K helicopters was about $350,000. The retrofit cost will be higher because the program manager had not received an estimate for the installation of the disconnects to the rest of the fuel system, to include the aerial refueling probe.

Installing the quick disconnects may be more involved than the program manager originally planned because further research and developmental costs may be necessary. The Air Force encountered similar fuel leakage problems on modified Black Hawk helicopters. The fuel spill occurred on the modified Black Hawk helicopter, the Night Hawk helicopter. The Night Hawk helicopter had essentially the same aerial refueling system as the one installed on the MH-60K. In 1985, the Air Force canceled the Night Hawk program and started the Pave Hawk program. The program manager for the Pave Hawk helicopter did not install the external fuel tanks on the Pave Hawk helicopter because Air Force officials believed that the external fuel tanks and refueling probe were structural problems that would need extensive research and development. To more easily load the Pave Hawk on a C-5 aircraft, the Air Force designed an antenna for the Pave Hawk helicopter, which can easily be removed to avoid any clearance problems when loading the Pave Hawk onto a C-5 aircraft. The Army may have to incur additional retrofit costs to relocate the antenna or install a removable antenna.

Pave Hawk Transportability. The Air Force Pave Hawk program manager modified the Black Hawk helicopter without ensuring that the helicopter could meet C-141 aircraft loading requirements. According to the

Pave Hawk program statement of need, the helicopter must be deployable aboard the C-141 aircraft for Air Force users to accomplish their missions. ATTLA had not certified that the Pave Hawk is transportable by C-141 aircraft as required by joint regulation. The joint regulation (AFR 80-18) states that if the Services expect to move a system in more than one type of aircraft, a test loading with each aircraft may be necessary.

The Pave Hawk program manager is modifying 97 Black Hawk helicopters by installing radomes to the nose of the helicopters. The radome was designed to help the helicopter operator in bad weather and provide ground mapping information. However, the addition of the radome under the nose of the helicopter may prevent transport of the Pave Hawk helicopter by C-141 aircraft.

C-141 Aircraft Loading. The Pave Hawk program manager had not obtained C-141 transport aircraft certification from ATTLA. Since March 1987, the program manager had obtained only C-5 aircraft certifications from ATTLA for the Pave Hawk helicopter. Although ATTLA certified the Pave Hawk helicopter for C-5 aircraft transport, the radome and the refueling probe imposed tight aircraft ramp and floor clearances that ATTLA had not tested. (See Appendix A for a depiction of the difficulties encountered when loading a Pave Hawk helicopter in a C-5 aircraft.) Although C-141 transportability has remained an essential transportation requirement for the users of the Pave Hawk helicopter, the Pave Hawk program manager had not provided ATTLA with the necessary funds and resources to perform the tests.

After the using commands requested that the Pave Hawk program manager obtain ATTLA certification to transport the helicopter by C-141 aircraft, logistics officials' in the program manager's office informed the users that the Pave Hawk could not be shipped in a C-141 aircraft because the radome would be crushed during loading, and the radome could not be removed before loading. Logistics officials' conclusions were based on their evaluation of the distance between the ground and the radome, the required C-141 floor clearances, and the radome being riveted on the frame of the helicopter.

Pave Hawk Planned Retrofits. Failure to transport the Pave Hawk helicopter by C-141 aircraft would affect the ability of the Air Force Special Operations Command and the Air Combat Command Air Rescue Service, two users of the Pave Hawk helicopter, to accomplish their combat search and rescue missions. The Air Force Special Operations Command submitted a retrofit modification proposal to the program manager to relocate the radome from the side to the front of the nose of the helicopter. The retrofit modification would provide a common radome location for both Army and Air Force special operations helicopters and facilitate transport by C-141 aircraft. The Special Operations Command was in the process of obtaining Headquarters, Air Force approval of the modification needed to transport the helicopter by C-141 aircraft. Additionally, the Air Rescue Service requested that the program manager obtain certification and procedures for C-141 transport of the Pave Hawk helicopters because of the high cost and the limited availability of C-5 aircraft and the increasing number of combat search and rescue helicopters that needed to be deployed. If the Air Combat Command were to determine that

the C-141 aircraft would need to transport the Air Rescue Service, the command would also require radome retrofit modifications to 87 helicopters. The cost to relocate the radome on 97 Pave Hawk helicopters would be about $4.4 million.

The ability and availability of the C-141 aircraft to transport the Pave Hawk helicopter had not been determined even though costly retrofits to move the radome on the helicopter were being considered. Although ATTLA officials acknowledged that the radome reduced the required floor clearances, they stated that a test loading of the helicopter on the C-141 aircraft would have to be performed to determine whether the radome would be crushed. At the time of audit, ATTLA was waiting for the program manager to provide the funds and resources necessary to test load the Pave Hawk helicopter onto the C-141 aircraft. The Air Mobility Command, which is the primary command responsible for managing and operating the Air Force's fleet of C-141 aircraft, informed the Air Rescue Service that developing procedures for tactical shipment of the Pave Hawk helicopter by a C-141 aircraft was not practical and that shipment by C-141 was difficult for rapid response deployments due to competing demands.

Internal Control Weaknesses. Program managers for modified Black Hawk helicopters did not adequately consider air transportability requirements of the helicopters during the acquisition process. The inadequate consideration of transportability needs occurred because internal controls had not been established to ensure that program managers met transportability requirements before modification of the helicopters occurred. The Army's MH-60K helicopter and the Air Force's Pave Hawk helicopter program managers proceeded to production of the modified helicopter without ensuring that the modified helicopters could meet their C-5 and C-141 aircraft transportability requirements. Production of the two helicopters occurred primarily because DoD Instruction 5000.2 does not clearly state when transportability approval should be obtained for major modification programs. DoD Instruction 5000.2 did not prevent program managers from proceeding to production of major modifications of weapon and support systems until transportability requirements were met.

Management Oversight. Interservice coordination among program managers for modified Black Hawk helicopters and transportability agencies to identify and correct transportability problems did not occur. The Army and Air Force program managers for the modified Black Hawk helicopters did not provide the necessary information to ATTLA to receive needed transportability approvals and certifications before item procurement. Officials in the MH-60K and Pave Hawk program offices stated that the refueling probe and antenna problems identified on the Night Hawk helicopter by the Air Force had not been discussed with the Army. Lessons learned by the Air Force on the Night Hawk could possibly have helped the Army avoid unnecessary retrofit costs on the MH-60K helicopter. The Air Force Pave Hawk program manager did not provide ATTLA with the planned design of the Pave Hawk helicopter before its production. Therefore, ATTLA could not inform the Pave Hawk program manager of the clearance difficulties imposed by the location of the radome during the design phase of the acquisition.

Management oversight is needed to ensure that transportability certifications are obtained before weapon and support systems are modified. With the implementation of DoD Instruction 5000.2, the responsibility for the transportability approval process became unclear. For example, neither ATTLA, which is under AFMC, nor TRANSCOM, which is responsible for transporting the modified helicopters, had adequate authority in the acquisition process to ensure that the program managers of the MH-60K and the Pave Hawk helicopters met transportability requirements. Therefore, no single agency is being held accountable for ensuring that air transportability requirements are met. Specific roles and responsibilities should be assigned to ensure that program managers meet system transportability requirements prior to major modifications. Issuance of planned DoD Directive 4510.XX is needed. Because of the lack of management oversight to ensure that program managers met transportability requirements, the Army and Air Force may spend about $4.8 million to retrofit modified Black Hawk helicopters to meet air transportability requirements.

Summary

DoD transportation guidance lacks clearly defined roles, responsibilities, and approval procedures for ensuring that transportability requirements are met during the acquisition process. Because of the lack of adequately defined roles, responsibilities, approval procedures, and internal controls, the transportability requirements of the AGS, JSIPS, and modified Black Hawk helicopters have not been met. As a result, about $2.2 billion may be spent procuring systems that cannot be deployed as needed to meet their mission requirements.

Recommendations, Management Comments, and Audit Response

1. We recommend that the Deputy Under Secretary of Defense (Logistics)

a. Revise DoD Directive 5158.4, "United States Transportation Command," to make the U.S. Transportation Command responsible for certifying that transportability requirements are met for major weapon and support systems before low rate initial production award, and production and major modification.

Management Comments. The Deputy Under Secretary of Defense (Logistics) nonconcurred, stating that transportability is a part of the Services' procurement mission to organize, train, and equip. The Deputy Under Secretary stated that rather than adding another approval layer to enforce transportability, it would be more efficient to require program executive officers and program managers to

comply with existing policies and procedures. The Deputy Under Secretary further stated that TRANSCOM is not assigned all transportation engineering activities involved in the acquisition process.

The Army and Air Force provided unsolicited comments to Recommendation 1.a. The Army Office of the Deputy Chief of Staff for Logistics nonconcurred stating that procurement, which includes transportability, is a Service-related responsibility. The Army stated that existing policies and directives are sufficient to ensure that transportability needs are met before initial low rate production, without adding another level of approval to the acquisition process. The Air Force Deputy Chief of Staff (Logistics) concurred with the recommendation stating that the designation of TRANSCOM as the focal point for certifying air transportability would help ensure that alternate modes of transportation are properly considered.

Audit Response. We do not agree with the Deputy Under Secretary of Defense (Logistics). We believe that the certification process for transportability should be outside the Services' procurement mission to ensure that transportability needs are met. TRANSCOM's independence from the acquisition community would help safeguard and enhance management controls related to transportability.

We disagree that TRANSCOM's responsibility for certification of transportability would add another approval level to ensure transportability. The Army presently obtains transportability approval from MTMC. The arrangement has not added another layer of approval; rather it has indirectly involved TRANSCOM in the transportability approval process. The present approval system is not ensuring that transportability needs are met. We therefore request that the Deputy Under Secretary of Defense (Logistics) reconsider Recommendation 1.a. and provide comments to the final report. The comments should include an estimated completion date for implementing DoD-wide policy guidance.

b. Promptly issue DoD Directive 4510.XX, "Defense Transportation Engineering," to clarify transportability roles and responsibilities, including those of the U.S. Transportation Command, and to establish the DoD policy needed to support the issuance and implementation of Joint Regulation (Army Regulation 70-44, Office of the Chief of Naval Operations 4600.22B, Air Force Regulation 80-18, Marine Corps Order 4610.14C, and Defense Logistics Agency Regulation 4500.25).

Management Comments. The Deputy Under Secretary of Defense (Logistics) partially concurred, stating that although transportability roles, responsibilities, and approval process need clarification, DoD Directive 4510.XX is not the right document to achieve that end. The Deputy Under Secretary stated that DoD Directive 4510.XX addresses DoD transportation policy, not the specific transportability certification process. He further stated that the specific transportability certification process is detailed in Joint Regulation (Army Regulation 70-44, Office of the Chief of Naval Operations 4600.22B, Air Force

Regulation 80-18, Marine Corps Order 4610.14C, and Defense Logistics Agency Regulation 4500.25). The Joint Regulation is undergoing revision and is expected to be circulated for comments by December 1993.

Although comments were not solicited, the Army Office of the Deputy Chief of Staff for Logistics partially concurred, stating that DoD Directive 4510.XX should be issued; however, the purpose of the directive is to establish an overall transportation policy, not to address the specifics for obtaining transportability certification. The Air Force Deputy Chief of Staff (Logistics) concurred, stating that issuing a new DoD directive will provide added emphasis to ensure that transportability is considered in the acquisition process and will improve readiness of the Armed Forces.

Audit Response. The proper document to establish transportability roles and responsibilities is DoD Directive 4510.XX, which needs to clarify TRANSCOM's role in ensuring transportability. However, we recognize that the Joint Regulation is a means to implement the policy. As a result, we have revised Recommendation 1.b. to have DoD Directive 4510.XX establish the DoD policy needed to support the issuance and implementation of the Joint Regulation. We, therefore, request that the Deputy Under Secretary of Defense (Logistics) comment on the revised Recommendation 1.b. in responding to the final report. The comments should include an estimated completion date for implementing DoD-wide policy and guidance.

2. We recommend that the Under Secretary of Defense for Acquisition and Technology revise DoD Instruction 5000.2, "Defense Acquisition Management Policies and Procedures," to require that program managers not proceed to low rate initial production award or major modification of weapon and support systems until transportability requirements are met.

Management Comments. The Deputy Under Secretary of Defense (Logistics) concurred, stating that DoD Instruction 5000.2 is being revised to require that program managers not proceed to low rate initial production contract award or major modification of weapon support systems until transportability requirements are met. The revision is expected to be completed within the next 6 to 8 months.

Although comments were not solicited, the Army Office of the Deputy Chief of Staff for Logistics and the Air Force Deputy Chief of Staff (Logistics) concurred with the intent of the recommendation.

Audit Response. The Deputy Under Secretary of Defense's (Logistics) planned actions are responsive, and no further comments are required.

3. We recommend that the Army Acquisition Executive reduce the Armored Gun System planned procurement by about $186 million for 58 systems if the Armored Gun System cannot be successfully low velocity airdropped from a C-130 aircraft; or if an alternative tactical aircraft that has demonstrated the capability to meet the Armored Gun System low velocity airdrop mission will not be available to support Armored Gun System airdrop missions.

Management Comments. The Army Office of the Deputy Chief of Staff for Logistics concurred, and stated that the AGS will successfully meet LVAD testing before procurement.

Although comments were not solicited, the Deputy Under Secretary of Defense (Logistics) concurred, and stated that the AGS program manager will conduct a static airdrop test in April 1994 and a live airdrop from a C-130 aircraft in November 1994. Additionally, the Office of the Assistant Secretary of the Army (Research, Development, and Acquisition) nonconcurred, and stated that adequate planned tests and evaluations exist to address the capability of the AGS to LVAD from a C-130 aircraft before low rate initial production contract award. The Office of the Assistant Secretary further stated that nonachievement of air transportability by tactical aircraft would jeopardize the entire program, not only the 58 systems mentioned. The Air Force Deputy Chief of Staff (Logistics) concurred, and stated that the AGS is capable of being airdropped by tactical aircraft. However, it cannot be airdropped at the weight, with enough fuel and ammunition, required to engage in immediate combat operations.

Audit Response. Although the Army Office of the Deputy Chief of Staff for Logistics indicated concurrence, it is unclear whether the stated actions meet the intent of the recommendation. The Office of the Deputy Chief of Staff stated that an AGS LVAD test will be conducted before procurement, but did not specify whether the test would be conducted from a C-130 aircraft before low rate initial production. The Deputy Under Secretary of Defense comments indicate that a C-130 aircraft will be used. If that is the Army's intent, we request such clarification. We are also concerned that the interpretation of the word "procurement" may not include low rate initial production.

We disagree with the Office of the Assistant Secretary of the Army (Research, Development, and Acquisition) in that planned tests and evaluations are sufficient to address the capability of the AGS to LVAD from a C-130 aircraft before the low rate initial production contract award. The approved AGS Test and Evaluation Master Plan (TEMP), signed by the Deputy Under Secretary of the Army (Operations Research) on October 5, 1992, required an LVAD test from a tactical aircraft, not a C-130 aircraft, before the low rate initial production decision. The LVAD test from a C-130 aircraft was scheduled in a draft TEMP but was not included in the approved TEMP. We are concerned that a C-17 aircraft will be used for the LVAD test because of the weight limitations of the C-130 aircraft; however, the C-17 aircraft would not be available to support AGS LVAD missions. The C-17 has already experienced schedule delays, technical deficiencies, and reduced procurement quantities.

4. We recommend that the Joint Services Imagery Processing System program manager coordinate with the Air Force Shelter Management Office to:

a. Verify that modified shelters can safely transport the Joint Services Imagery Processing System and be effectively supported in the field.

Management Comments. The Air Force Deputy Chief of Staff (Logistics) concurred. The concurrence included comments from the JSIPS program

manager, stating that information on the JSIPS has been provided to the Shelter Management Office and office personnel are working to add the JSIPS shelters to the DoD standard family of shelters. The JSIPS program manager also stated that the Shelter Management Office has agreed to analyze JSIPS shelter design data, test results and deployment history to verify that the modified shelters can safely transport the system.

Although comments were not solicited, the Deputy Under Secretary of Defense (Logistics) partially concurred and the Army Office of the Deputy Chief of Staff for Logistics concurred with the recommendation. Both noted that JSIPS did obtain air movement certification.

Audit Response. The Air Force's action is responsive to Recommendation 4.a. However, we request that the JSIPS program manager provide dates of completion for the planned corrective action.

b. Purchase the additional shelters needed.

Management Comments. The Air Force Deputy Chief of Staff (Logistics) nonconcurred, stating that the use of tailored shelters versus DoD standard shelters was necessary to satisfy the specific shelter design factors identified by the system transport requirements. The Deputy Chief of Staff also provided the JSIPS program manager's comments to the recommendation. The program manager stated that the use of standard shelters for production would increase the technical risk which would be either unaccepted by the prime contractor or too costly. The program manager conceded that procurement of "identical" JSIPS shelters through the Shelter Management Office would result in some small savings; however, the schedule risk associated with providing the shelters through the Shelter Management Office would more than offset any potential gains.

Although comments were unsolicited the Deputy Under Secretary of Defense (Logistics) and the Army Office of the Deputy Chief of Staff for Logistics concurred with Recommendation 4.b. However, both stated that using standard shelters versus contractor-modified shelters would double the quantity of shelters required, due to the unique JSIPS weight requirements. Both offices concluded that the JSIPS program office is saving $1 million by using modified shelters and the most effective way to meet system cost and schedule is to use contractor provided shelters.

Audit Response. We consider the Air Force comments to be nonresponsive. The recommendation did not direct the JSIPS program manager to procure DoD standard shelters; rather, it is to ensure that the Shelter Management Office assists in the most economical procurement of "identical" shelters. As reported, the Shelter Management Office has the assigned responsibility and authority for development and acquisition of shelters when new or modified shelters are required. Further, the JSIPS program manager acknowledged that the procurement of "identical" shelters through the Shelter Management Office will result in a savings and will not increase shelter costs. In addition, the JSIPS program office did not coordinate their shelter procurements with the Shelter Management Office during development and, as a result, the JSIPS' schedule

risk associated with obtaining shelters through the Shelter Management Office is unknown. Therefore, we request that the Air Force Deputy Chief of Staff (Logistics) reconsider his position in response to the final report.

5. We recommend that the Army Space Program Office, in conjunction with the Army Tank Automotive Command, verify that Joint Imagery Processing System trailers can safely transport the modified and overloaded shelters and that the trailers can be effectively supported in the field.

Management Comments. The Army Office of the Deputy Chief of Staff for Logistics concurred, stating that initial coordination with TACOM was projected for August 30, 1993. The Office of the Deputy Chief of Staff included comments from the Office of the Assistant Secretary of the Army (Research, Development, and Acquisition), which stated that the Army Space Program Office and TACOM will work together to get an approved modification for the modified trailers and they will work together to develop and build trailers that will satisfy future Army JSIPS requirements. The Office of the Assistant Secretary also stated that TACOM was reviewing JSIPS trailer requirements that it received in late May 1993. A completion date was pending based on funding and fielding of future Army JSIPS.

Although comments were not solicited, the Deputy Under Secretary of Defense (Logistics) and the Air Force Deputy Chief of Staff (Logistics) concurred with the recommendation. The Deputy Under Secretary stated that initial coordination between the Army Space Program Office and TACOM to obtain approval for the modified JSIPS trailers was to occur in August 1993. The Army Space Program Office and TACOM will work together to develop and build trailers to meet future requirements.

Audit Response. The Army's action is responsive to the recommendation. Further coordination by our office has revealed that TACOM has outlined an initial coordination schedule with the Army Space Program Office in a letter, dated August 26, 1993. We request that the Army provide dates of completion for the approval of the modified trailers and the development of trailers to meet future JSIPS needs.

6. We recommend that the Commander, United States Special Operations Command, develop, with the Air Transportability Test Loading Agency, the loading plans for the reconfigured MH-60K helicopter before performing the retrofits to the fuel system and antenna.

Management Comments. The Deputy Commander in Chief, United States Special Operations Command nonconcurred and stated that loading plans have always been a basic part of the program, and the plans are updated as design, test results, and customer direction dictate.

Although comments were not solicited, the Deputy Under Secretary of Defense (Logistics), the Army Office of the Deputy Chief of Staff for Logistics, and the Department of the Army Product Manager, Special Operations Aircraft, nonconcurred with the recommendation and provided comments similar to those provided by the Special Operations Command.

Audit Response. The Deputy Commander in Chief, United States Special Operations Command, comments are not responsive to the recommendation. The basic principle is to ensure that loading plans are in place for the reconfigured helicopter to meet its transportability requirements. As a result of tests, ATTLA provides approvals of the loading, securing, and off-loading procedures for inclusion in the joint transportability guidance publication. The loading plans that ATTLA received were based on previous test loadings of the Black Hawk helicopter, not the reconfigured MH-60K helicopter. Loading plans should include procedures for transporting the MH-60K helicopter safely and efficiently without incurring any major problems, such as fuel spillage. Transportability approval should be obtained to avoid possible additional modifications. Such approval would ensure that transportability requirements are met. Program managers should not proceed with major modifications of weapon and support system until transportability requirements are met, to include the appropriate approval from ATTLA on the loading plans for the MH-60K. We, therefore, request that the Deputy Commander in Chief, United States Special Operations Command, reconsider his position in response to the final report.

7. We recommend that the Pave Hawk helicopter program manager cancel plans to spend about $4.4 million to retrofit the helicopter unless the Air Transportability Test Loading Agency determines that the Pave Hawk cannot be loaded onto the C-141 aircraft without the retrofit, and the Air Force's Air Mobility Command states that the C-141 aircraft will be available to transport the Pave Hawk helicopters.

Management Comments. The Air Force Deputy Chief of Staff (Logistics) concurred, stating that the test cited in the recommendation should be stated that the Pave Hawk program should proceed if the Pave Hawk can be loaded with the retrofit.

Although comments were not solicited the Deputy Under Secretary of Defense (Logistics) partially concurred with the recommendation. The Office of the Assistant Secretary of the Air Force (Acquisition) in an attachment to the comments from the Deputy Under Secretary of Defense (Logistics) nonconcurred with the recommendation. The Deputy Commander in Chief of United States Special Operations Command, one of the users of the Pave Hawk helicopter, also provided unsolicited comments. The Deputy Commander in Chief concurred with the recommendation and stated that, before relocating the radome, a test loading of the Pave Hawk helicopter needs to be performed to determine if the current helicopter configuration will fit on a C-141 aircraft. The Deputy Commander in Chief commented that if the radome is relocated, the Pave Hawk helicopter should be transportable in the C-141 aircraft and its operational effectiveness improved. The Deputy Under Secretary of Defense (Logistics) and the Office of the Assistant Secretary of the Air Force (Acquisition) stated that the retrofit is being conducted primarily to improve the helicopters operational effectiveness. Both offices also noted that the program manager will perform the necessary engineering studies and the program manager has coordinated with the Air Transportability Test Loading Agency for a test loading of the Pave Hawk helicopter. Comments from the Office of the Assistant Secretary of the Air Force (Acquisition) stated that the Air Force has

no objection to the test loading of the Pave Hawk on the C-141 aircraft for certification purposes; however, the Air Force will continue with its plans to modify the Pave Hawk.

Audit Response. Although the Air Force Deputy Chief of Staff (Logistics) concurred with the recommendation to cancel the plans for the retrofit if stated conditions occur, the intent of his comments is unclear. The Office of the Assistant Secretary of the Air Force (Acquisition) nonconcurred and stated that they will continue with the plans to retrofit the helicopter. Based on this nonconcurrence, it appears that the Air Force might perform the retrofits, before the test loading is completed. The intent of the recommendation is to ensure that the proper transportability approvals are obtained before modifications or retrofits are made. Such approval would ensure that transportability requirements are met. The Air Force originally placed the radome on the helicopter without obtaining C-141 transportability approval. Transportability approval should be obtained to avoid unnecessary retrofits. We agree with the Deputy Commander in Chief of United States Special Operations Command that there needs to be assurance that the current helicopter configuration will not fit into the C-141 aircraft, before relocating the radome. Therefore, we request that the Air Force provide clarification of their position on the recommendation.

Potential Monetary Benefits, Management Comments, and Audit Response

Potential monetary benefits are claimed by Recommendations 3., 4.b., 6., and 7.

Recommendation 3. The Army Acquisition Executive should avoid spending about $186 million if the AGS cannot meet its LVAD requirement.

Management Comments. The Army Office of the Deputy Chief of Staff for Logistics, responding for the Army, did not comment on the potential monetary benefits. However, the Office of the Assistant Secretary of the Army (Research, Development, and Acquisition) provided unsolicited comments. The Office of the Assistant Secretary disagreed that about $186 million could be spent for 58 AGS vehicles without ensuring that the AGS can be airdropped from a C-130 aircraft. The Assistant Secretary stated that information concerning AGS LVAD would be prepared to satisfy the transportability exit criteria of the acquisition baseline. The Assistant Secretary also stated that no production funds will be obligated for low rate initial production until all exit criteria are addressed and decided on by the Department of the Army In-Process Review Board. The Assistant Secretary further stated that the AGS contractor was under contract to meet the C-130 LVAD at level I armor weight (about 35,500 pounds item weight limit) and that one of the purposes of the engineering and manufacturing development phase of the acquisition process is to finalize vehicle design and solve unforeseen problems, such as weight growth.

Audit Response. The AGS must be successfully LVAD tested from a C-130 aircraft before low rate initial production in order to adequately address transportability exit criteria. If this test is not successfully completed, there is no assurance that the AGS project office won't spend about $186 million developing 58 AGS vehicles which cannot meet the mission needs of the XVIII Airborne Corps.

Transportability exit criteria may not be sufficient to ensure that the AGS is capable of a LVAD from a C-130 aircraft before low rate initial production. The best way to ensure that the AGS meets the transportability requirement is to successfully LVAD an AGS from a C-130 aircraft before the low rate initial production decision. However, the approved AGS TEMP, signed by the Deputy Under Secretary of the Army (Operations Research) on October 5, 1992, did not specifically schedule an LVAD test from a C-130 aircraft. An LVAD test from a C-130 aircraft should be conducted to ensure that the weight restrictions of the C-130 aircraft are met. Such tests would provide review boards with solid evidence that transportability requirements are met. Safeguards are needed in acquisition guidance to ensure that transportability requirements are demonstrated before systems enter low rate initial production.

Although the engineering and manufacturing development phase of the acquisition process is to finalize vehicle design, the estimated weight of the AGS design had surpassed the weight limit by about 1,200 pounds for LVAD from a C-130 aircraft. The Army had no assurance that the AGS would meet the LVAD weight restrictions before low rate initial production.

Recommendation 4.b. The JSIPS program could avoid spending about $1.6 million if additional shelter procurements are coordinated with the Air Force Shelter Management Office.

Management Comments. The JSIPS program manager nonconcurred with the audit finding stating, "A savings of $2.0M [million] could have been achieved during Engineering, Manufacturing and Development phase if standard shelters were procured from the Army Aviation Troop Support Command. An additional $1.6M [million] expenditure could potentially be avoided if production shelters are obtained through the military item manager." The JSIPS program manager challenged the methodology employed to calculate the proposed savings, stating that the JSIPS shelter cost was only $1.3 million for eight shelters, not $2.9 million; and that JSIPS shelters include tailored features unique to JSIPS requirements that would not be included in the cost of a standard shelter. The JSIPS program manager also stated that twice as many standard shelters would be needed to handle the unique weight capacities of the JSIPS shelters, therefore, any potential cost benefit based on shelter procurement would be lost. The Assistant Secretary of the Army (Research, Development, and Acquisition) provided comments similar to those that the JSIPS program manager provided. The Army added that the JSIPS program manager would need to procure 56 standard shelters at $5.2 million versus the planned 28 nonstandard shelters at $4.2 million, thereby saving the Government $1 million.

Audit Response. Our estimated cost of shelters is accurate and conservative. The potential monetary benefits were based on data obtained from the JSIPS program office. The $2.9 million estimate of contractor provided engineering, manufacturing, and development shelters was obtained from the purchase order between the prime contractor and the subcontractor who provided the eight shelters. The JSIPS contracting officer stated that an additional 12 percent, which would include prime contractor profit, overhead, and incentive fees, should be added to the cost for the shelters from the prime contractor. The price quotes for shelters were averaged and the 12-percent markup was applied to determine the estimated cost for contractor provided production shelters. The Shelter Management Office could have procured the shelters directly from a shelter contractor had the JSIPS program manager contacted the office and thereby avoided paying the prime contractor overhead costs.

The estimated costs of shelters provided through the Army's item manager for shelters were based on actual level 3 engineering drawings for the JSIPS shelters. The shelters would meet the same requirements as those provided by the prime contractor. Estimates from the Army's item manager represent the same quantity and type of shelter as the estimates for contractor provided shelters and are a valid basis for comparison to arrive at the potential savings cited in the report. We therefore, request that the JSIPS program office reconsider its position on the potential monetary benefits in response to the final report.

Recommendation 6. The U.S. Special Operations Command could avoid spending $350,000 for quick dry disconnect modifications if loading plans are developed with the Air Transportability Test Loading Agency before performing modifications.

Management Comments. The Deputy Commander in Chief, U.S. Special Operations Command disagreed that the spending of $350,000 could be avoided. In addition, the Army's Product Manager, Special Operations Aircraft, provided unsolicited comments also disagreeing that the spending of $350,000 could be avoided. Both stated that the cost of implementing the recommendation would outweigh the benefits. The Special Operations Command reported that the MH-60K program avoided close to $1 million in added costs by using a retrofit kit, rather than paying the high overhead rates of the aircraft manufacturer.

Audit Response. The Army Product Manager, Special Operations Aircraft, should not have been allowed to proceed with modifying 23 helicopters, at a cost of $548 million, until transportability requirements were met, to include the appropriate approval from ATTLA on the loading plans for the MH-60K. The transportability test loading of the MH-60K helicopter occurred 10 months after the Product Manager had awarded the prime contractor a modification contract to produce 11 MH-60K helicopters. Retrofit cost could have been avoided had transportability been adequately addressed during the development. Transportability approval should be obtained before an additional $350,000 is spent retrofitting the helicopter.

Recommendation 7. The Air Force might avoid spending about $4.4 million by ensuring that the Pave Hawk helicopter can be loaded in a C-141 aircraft before retrofitting the helicopters.

Management Comments. The Air Force did not provide any comments to the potential monetary benefits; however, unsolicited comments were provided by the Deputy Commander in Chief, U.S. Special Operations Command. The Deputy Commander in Chief disagreed that $4.4 million could have been avoided. The Deputy Commander in Chief stated that canceling the retrofit on 97 aircraft would save about $43,000 per aircraft. However, the Deputy Commander in Chief noted that all 97 aircraft may not require modification.

Audit Response. The entire fleet of Pave Hawk helicopters have the requirement to be transportable by C-141 aircraft, therefore if the Air Force retrofits all 97 helicopters, the potential monetary benefits would be about $4.4 million, $43,000 per helicopter for recurring engineering and installation costs and about $288,000 for nonrecurring costs. We therefore request, that the Air Force provide comments on the potential monetary benefits in response to the final report.

RESPONSE REQUIREMENTS FOR EACH RECOMMENDATION

Responses to the final report are required from the addressees shown for the items indicated with an "X" in the chart below.

		Response Should Cover:			
Number	Addressee	Concur/ Nonconcur	Proposed Action	Completion Date	Related Issues*
1.a.	DUSD(L)**	X	X	X	IC
1.b.	DUSD(L)	X	X	X	IC
3.	Army		X	X	M
4.a.	Air Force			X	
4.b.	Air Force	X	X	X	M
5.	Army			X	
6.	Special Operations Command	X	X	X	M
7.	Air Force		X		M

*M = monetary benefits; IC = material internal control weakness
**Deputy Under Secretary of Defense (Logistics)

Part III - Additional Information

Appendix A. Profile of Systems Reviewed

AGS. The AGS is a light armored vehicle containing a direct fire capability. The Army is developing the AGS, which will be operated by a three-person crew. It will have a 105mm main gun; an automatic loader; a 7.62mm coaxial machine gun; and a commanders' weapon consisting of a .50-caliber machine gun, a 7.62mm machine gun, or a 40mm automatic grenade launcher. Three levels of protective armor will be available for the AGS. A base armor will be supplied on the vehicle and two additional armor packages can be added to provide additional protection. The AGS will provide firepower to forces deployed in support of operations where tanks are not available and will be used in airdrop and forced entry operations when deployability is essential. Light Cavalry Regiments will also use the AGS for cavalry reconnaissance and security missions. The AGS is required to be air transported by the C-130 and C-17 aircraft for LVAD missions, and the C-130, C-17, C-141, and C-5 aircraft for roll-on/roll-off missions.

JSIPS. The JSIPS is a modular, segmental, and tactically deployable imagery collection system. The JSIPS will be capable of being deployed to receive, process, and disseminate imagery products collected by tactical and national intelligence assets. JSIPS is being procured jointly by the Military Departments with the Air Force as the lead. The Army, Air Force, and Marine Corps JSIPS will be transported in tactical shelters. Tactical shelters are transportable structures designed to provide a work in capability. The Navy JSIPS is scheduled to be installed on board ships without the use of tactical shelters. The JSIPS is required to be surface transported by semi-trailers, dolly sets, and 5-ton trucks.

Modified Black Hawk Helicopters (MH-60K and Pave Hawk). The MH-60K helicopter is a modified version of the Black Hawk helicopter with a refueling probe installed. The MH-60K is a medium lift helicopter that will support Army special operations. The Army is procuring 23 MH-60K helicopters. The MH-60K helicopter is required to be air transported by the C-141 and C-5 aircraft.

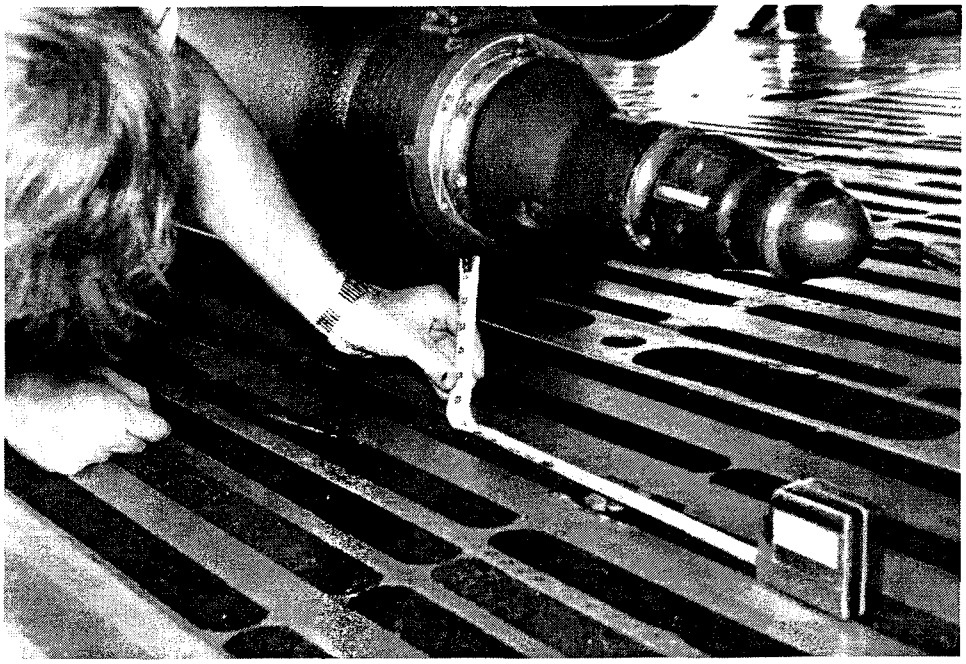
The Pave Hawk helicopter is a modified version of the Black Hawk helicopter with a self-extending refueling probe and a color weather radar with radome. The Pave Hawk is a medium lift helicopter that will support special operations and combat search and rescue missions. The Air Force is procuring 97 Pave Hawk helicopters. The Pave Hawk helicopter is required to be air transported by C-141 and C-5 aircraft.

The AGS base design

Army MH-60K Helicopter

Air Force MH-60G (Pave Hawk) Helicopter

During the front loading of the Pave Hawk Helicopter in a C-5 aircraft difficulties were encountered. A ramp had to be designed to prevent possible damage of the refueling probe and radome.



The refueling probe imposes tight ramp clearances with the aircraft floor once loaded into the C-5 aircraft.

Appendix B. DoD Acquisition and Transportability Guidance Revisions

Guidance	Subject	Date of Previous Guidance	Date of Current Guidance
DoD Directive 5000.1	Defense Acquisition	Sept. 1987	Feb. 1991
DoD Instruction 5000.2	Defense Acquisition Management Policies and Procedures	Sept. 1987	Feb. 1991
DoD Directive 5158.4*	United States Transportation Command	Guidance did not exist	Jan. 1993
DoD Directive 4510.XX	Defense Transportation Engineering	Guidance did not exist	Guidance is in draft
Joint Regulation (Army Regulation 70-44, Office of the Chief of Naval Operations Instruction 4600.22B, Air Force Regulation 80-18)	DoD Engineering for Transportability	Sept. 1987	Guidance is in draft
Army Regulation 70-47	Army Engineering for Transportability	Aug. 1985	To be consolidated into new joint Army Regulation 70-44, Office of the Chief of Naval Operations Instruction 4600.22B, and Air Force Regulation 80-18

* DoD Directive 5158.4 does not reference transportability.

Appendix C. Transportability Activities and Their Responsibilities

Activities	Responsibilities
OSD	
Deputy Under Secretary of Defense (Logistics)	Establishes policies for DoD activities concerning the effective use of transportation resources and the development and operation of transportation single manager agencies. Issues guidance for the Defense Standardization and Specification Program.
Under Secretary of Defense for Acquisition and Technology, Deputy Director (Land Warfare)	Processes requests to procure shelters not approved as part of the DoD Standard Family Shelters.
Transportation Policy Council	Reviews and assesses the effectiveness of DoD transportation and traffic management policies, programs, and systems. Consists of the Deputy Assistant Secretary of Defense (Logistics and Materiel Management, Director for Energy and Transportation Policy, and the Deputy Director for Transportation Programs.)
Army	
Assistant Secretary of the Army (Installations and Logistics)	Responsible for transportability policy guidance in Army.
Assistant Secretary of the Army (Research, Development, and Acquisition)	Coordinates with the Assistant Secretary of the Army (Installations and Logistics) in the preparation of Army transportability policy guidance.
Deputy Chief of Staff for Research, Development, and Acquisition	Ensures that transportability is considered during research, development, test and evaluation of Army acquired systems.
Deputy Chief of Staff for Logistics	Has general responsibilities for the Army's transportability program.

Army (cont'd)	
Army Materiel Command	Conducts the Army's research and development programs for air transportable and airdroppable materiel.
Materiel Systems Analysis Activity	Acts as the independent logistician for Army acquisition programs on behalf of the Army Office of the Deputy Chief of Staff for Logistics. Prepares integrated logistic support plans for weapon systems. Performs test designs and independent evaluations for major Army programs.
Natick Research, Development, and Engineering Center	Provides transportation certification for materiel to be internally/externally transported by Army rotary winged aircraft and safe recovery certification for materiel with rigid configurations to be airdropped by fixed wing aircraft. Assesses requirements for standard or developmental shelters and provides technical shelter information.
Navy	
Commander, Naval Supply Systems Command, Deputy Commander for Transportation	Provides transportability approval to Navy agencies and sealift transportability approvals to other DoD activities.
Air Force	
Deputy Chief of Staff (Logistics), Director of Transportation	Responsible for transportability guidance in the Air Force.
Air Force Materiel Command Logistics Directorate Transportation Division	Provides transportability approvals to Air Force agencies. Transportability of systems within each of the Air Forces' four product divisions is maintained by the packaging, handling, and transportation officials.
Aeronautical Systems Center, Air Transportability Test Loading Agency	Provides air transportability approvals for airlifted items using military airlift systems, regardless of the user of the airlift services. This includes certification of the rigged configuration loads to ensure that each configuration can be safely flown and extracted from the aircraft.

Marine Corps	
Deputy Chief of Staff (Installations and Logistics)	Responsible for transportability policy guidance in the Marine Corps.
Logistics Plans, Policies, and Strategic Mobility Division	Transportability focal point in the Marine Corps.
Other Defense Organizations	
Transportation Command	Provides air, land, and sea transportation for DoD. Has command of the Military Traffic Management Command, the Military Sealift Command, and the Air Mobility Command in peace and war time.
Military Traffic Management Command	Provides transportability approval to Army agencies, and land transportability approval to other DoD activities.
Transportation Engineering Agency	Prepares transportability engineering analyses for all items for which a transportability report is submitted. Obtains transportability engineering analyses, test loadings, and transportability approvals for Army system acquisitions from other Military Departments.
Military Sealift Command	Provides sealift transportability certifications.
Air Mobility Command	Provides air transport on Air Force aircraft.
Joint Committee on Tactical Shelters	Recommends policy and guidance for the DoD Tactical Shelter Program. Reviews all requests for nonstandard shelter waivers and forwards recommendations for approval or disapproval to the Under Secretary of Defense for Acquisition and Technology. The Committee consists of representatives from each of the Services' shelter offices.

Appendix D. DoD Airlift Resources

Aircraft	Quantity
C-5	109[1]
C-17	120[2]
C-130	442[1]
C-141	234[1]

[1]These figures do not include aircraft allocated for training or backup maintenance.

[2]Planned procurement was limited to 40 aircraft in December 1993 by the Secretary of Defense. There may be 120 aircraft acquired if delivery schedules and technical requirements are met in 1995. The Air Force stated that the first C-17 squadron is scheduled to be operational in the Air Force in January 1995.

Appendix E: Audit Responses to Specific Management Comments

Final Report Page No.

The following paragraphs provide audit responses to specific management comments to the draft report finding from the Office of the Assistant Secretary of the Army (Research, Development, and Acquisition), the Office of the Assistant Secretary of the Air Force (Acquisition), the Air Force Deputy Chief of Staff (Logistics), the U.S. Special Operations Command, Program Manager, Special Operations Aircraft, and the Joint Services Imagery Processing System Program Office.

Internal Controls

Management Comments. Page 3: The Office of the Assistant Secretary of the Army (Research, Development, and Acquisition), in an attachment to the comments from the Deputy Under Secretary of Defense (Logistics), disagreed that internal control policy guidance and procedures were insufficient to ensure that the AGS program manager met transportation requirements for the AGS before low rate initial production. The Assistant Secretary stated that internal controls such as technical reviews, management reviews, test integration working group meetings, and engineering and manufacturing development exit criteria exist to ensure that the LVAD requirement is met before low rate initial production. The Assistant Secretary further stated that all transportability requirements and issues for the AGS are coordinated between transportability representatives. 3

Audit Response. We believe that technical reviews, management reviews, test integration working group meetings, and engineering and manufacturing development exit criteria do not ensure that the AGS will meet transportability requirements before low rate initial production. Acquisition guidance does not require that transportability approval and certifications be obtained before systems enter low rate initial production. As a result, the AGS could proceed into low rate initial production without demonstrating its LVAD capability from a C-130 aircraft.

Management Comments. Page 3: The Department of the Army Product Manager, Special Operation Aircraft, in an attachment to the comments from the Deputy Under Secretary of Defense (Logistics), stated that while leadership is streamlining the acquisition process and focusing responsibility and authority at the lowest level, the Inspector General, DoD, believes that the solution to all problems is to elevate actions to the highest level. There is no justification provided in the report for the recommended additional controls nor is the source of additional resources to implement such a concept stated. 3

Audit Response. It is management's responsibility to ensure that internal control procedures are in place to detect and correct errors and weaknesses

Final Report
Page No.

promptly and accurately. In accordance with DoD Instruction 5000.2, program mangers are allowed to modify major weapons and support systems without ensuring that the transportability requirements are met. Program managers for major weapons systems are making major modifications after milestone III production approval without ensuring the transportability of the modified weapons systems. As a result, the MH-60K Program Manger modified the Black Hawk helicopter without correcting the previously identified fuel spill, antenna, and towing problems. Therefore, unnecessary and costly retrofits are being performed in order for the helicopter to meet its transportability requirements.

Finding

7 **Management Comments.** Page 7: The Office of the Assistant Secretary of the Army (Research, Development, and Acquisition) disagreed that streamlined acquisition guidance has made transportability roles and oversight responsibilities uncertain. The Deputy stated that organizations such as MTMC and the U.S. Army Natick Research, Development, and Engineering Center (Natick) have undertaken active roles in AGS transportability and are fully competent and cognizant of their responsibilities.

Audit Response. The draft report recognized that MTMC, Natick, and other activities were actively involved in the transportability of the AGS; however, the guidance specifying their roles and responsibilities is being issued or revised. The primary DoD and Service transportability guidance, draft DoD Directive 4510.XX, "Defense Transportation Engineering," has not been issued and draft Joint Regulation (Army Regulation 70-44, Office of the Chief of Naval Operations Instruction 4600.22B, Air Force Regulation 80-18, Marine Corps Order 4610.14C, and DLA Regulation 4500.25) is being revised. Additionally, DoD Instruction 5000.2 did not preclude program managers from awarding low rate initial production contracts before transportability requirements are met. As a result, transportability and acquisition guidance did not clearly identify transportability roles, responsibilities, and approval procedures.

7 **Management Comments.** Page 7: The Air Force Deputy Chief of Staff (Logistics) agreed that there is no single DoD organization responsible for ensuring that transportability requirements are met. However, the Air Force suggested that a sentence be added to the paragraph to clarify that the Services have assigned the transportability responsibility to their respective transportability agents.

Audit Response. We revised the final report to reflect that each Service has an assigned transportability agent responsible for ensuring that transportability requirements are met.

8 **Management Comments.** Page 8: The Air Force Deputy Chief of Staff (Logistics) disagreed with the statement, "The Services were drafting a joint

regulation,...." The Air Force prefers that the statement reads, "the Services are updating...." The Air Force stated that the joint regulation was first issued on September 1, 1978, and therefore, was being updated.

Audit Response. The final report was revised to state that the Services are updating the joint regulation, rather than drafting a new joint regulation.

Management Comments. Page 9: The Office of the Assistant Secretary of the Army (Research, Development, and Acquisition) disagreed that the AGS transportability requirements had not been effectively met and that the AGS program manager had not adequately considered transportability during the acquisition process. The Army stated that transportability had been an integral part of the AGS acquisition process and was a critical factor in structuring the acquisition strategy. The Army referenced an interim transportability engineering analysis that MTMC prepared for the AGS in November 1992 to show that system performance was the most important element in the technical area. The analysis stated that at armor level I, the AGS meets the dimensional and weight requirements for LVAD from the C-130 and C-17 aircraft. 9

Audit Response. Although transportability was a critical factor in the acquisition of the AGS, the estimated weight of the AGS design increased to about 1,200 pounds over the weight limit for LVAD from a C-130 aircraft. Further, MTMC's interim transportability engineering analysis was based on weight information that the prime contractor provided in an August 3, 1992, transportability report. The report stated that the estimated weight of the current AGS design, protection level I, was 35,500 pounds. However, the information we obtained from the prime contractor during an August 4 through 6, 1992, visit revealed that the AGS design weighed an estimated 36,400 pounds, approximately 900 pounds over the weight limit for LVAD from the C-130 aircraft. MTMC's analysis was not based on the updated weight estimate.

Management Comments. Page 9: The Office of the Assistant Secretary of the Army (Research, Development, and Acquisition) stated that milestone II approval in May 1992 was for entry into engineering and manufacturing development, not low rate initial production as stated in the draft report. The Army also stated that the low rate initial production contract award was scheduled for December 1994, not November 1994, as stated in the draft report. 9

Audit Response. The final report was revised to state that the milestone II approval in May 1992 was for entry into the engineering and manufacturing development phase of the acquisition process and that the low rate initial production contract is scheduled to be awarded in December 1994. However, the milestone II approval for entry into the engineering and manufacturing development phase also involves a commitment to low rate initial production. In accordance with DoD Instruction 5000.2, no milestone decision is required between milestone II and milestone III (production approval). However, the low rate initial production contract award for the AGS was scheduled between milestone II and milestone III.

Final Report Page No.

10 **Management Comments.** Page 10: The Office of the Assistant Secretary of the Army (Research, Development, and Acquisition) disagreed that modifications or the need to airdrop with increased fuel and ammunition would increase the weight of the AGS. The Army stated that the overall AGS LVAD package weight will be maintained within the weight limit of the C-130 aircraft and that any "new" requirements affecting weight will be assessed and traded off for weight in other areas.

Audit Response. Documentation that we obtained from the AGS project office revealed that the estimated weight of the AGS design was about 1,200 pounds over the limit to LVAD from a C-130 aircraft. Moreover, the AGS project office requested a weight waiver from the Air Force to allow the AGS to LVAD at 2,200 pounds over the LVAD weight limit for the C-130. The waiver was requested to allow for additional fuel, ammunition, and on-board equipment. The AGS project manager stated that users were concerned over airdropping the AGS without adequate logistical support. Based on that information, we question the ability of the AGS project manager to reduce the AGS LVAD weight and provide adequate logistical support.

10 **Management Comments.** Page 10: The Air Force Deputy Chief of Staff (Logistics) stated that the rigged weight limit for LVAD from a C-130 aircraft is 42,000, not 35,500 pounds, as stated in the draft report.

Audit Response. The draft report stated that the C-130 aircraft had a item airdrop weight limit, not a rigged airdrop weight limit, of 35,500 pounds. According to the Initial Transportability Engineering Analysis for the AGS prepared by the MTMC, the item weight limit for a LVAD from a C-130 aircraft is about 35,500 pounds. The item weight does not include the airdrop platform, parachutes, tiedowns, and other airdrop materials, which weigh an estimated 6,500 pounds, resulting in the 42,000 pound rigged airdrop weight.

10, 40 **Management Comments.** Page 10; page 33, Appendix D: The Air Force Deputy Chief of Staff (Logistics) stated that 120 C-17 aircraft are scheduled for procurement, including training and backup planes. The Air Force further stated that the first C-17 aircraft squadron is scheduled to be operational in January 1995, not September 1994.

Audit Response. The final report was revised to state that 120 C-17 aircraft are scheduled to be procured. The 102 aircraft cited in the draft report did not include aircraft allocated for training and back-up maintenance. The final report was also revised to state that the first C-17 aircraft squadron is scheduled to be operational in January 1995.

10 **Management Comments.** Page 11: The Office of the Assistant Secretary of the Army (Research, Development, and Acquisition) disagreed that the AGS program office was not scheduled to receive transportability certification for the AGS before low rate initial production, and that the program manager did not schedule a C-130 LVAD test to support the low rate initial production decision.

The Deputy stated that scheduled testing would provide the In-Process Review Board adequate information on the capability of the C-130 LVAD so that it can make the proper decision.

Audit Response. According to MTMC's Interim Transportability Engineering Analysis, dated November 1992, the AGS project office is not scheduled to receive transportability approval, to include certification, until after the low rate initial production decision. Additionally, the approved TEMP for the AGS did not specifically schedule a LVAD test from a C-130 aircraft.

Management Comments. Page 12: The JSIPS program manager partially concurred with the statement that the JSIPS did not coordinate with the Air Force Shelter Management Office and did not use a shelter from the DoD standard family of tactical shelters. The JSIPS program manager stated that the auditors where shown a trade study that concluded that existing DoD standard shelters could not satisfy JSIPS requirements. However, the JSIPS program manager also stated that since the JSIPS shelters have been developed, the Shelter Management Office has been contacted to try to add the JSIPS shelters to the DoD standard family. 10

Audit Response. The JSIPS program manager misinterpreted the report finding on the modification of shelters. The report does not state that the JSIPS could have used standard shelters. Rather, the JSIPS program manager was required to coordinate modifications with the Air Force Shelter Management Office to reduce the duplication of effort within the tactical shelter community and to ensure effective life cycle cost, performance, reliability, and maintainability of the shelters. The JSIPS program manager did not comply with Air Force Regulation 800-3C2, "Acquisition Management Engineering for Defense Systems," which requires that program offices with tactical shelter requirements identify their needs to the Air Force Shelter Office.

Management Comments. Page 13: The JSIPS program manager stated that the JSIPS shelters were not overloaded because they were specifically designed to handle the JSIPS payload. The JSIPS program manager contended that adequate confirmation that the shelters are not overloaded exists because the JSIPS shelters underwent mobility testing for over the road transport, received air transport certification, and have been certified for shipboard transportation. 12

Audit Response. The report states that the shelters are overloaded based on DoD stated capacities for similar DoD tactical shelters. The weight difference demonstrates the significance of the JSIPS shelter modifications and supports the audit recommendation that specially designed shelters be evaluated by the Shelter Management Office, which is tasked to ensure the adequacy of shelter construction. The JSIPS shelters were subjected to testing; however, the Shelter Management Office, which has the designated expertise to determine if the testing of such unique shelters was adequate, was ignored.

Management Comments. Page 14: The Office of the Assistant Secretary of the Army (Research, Development, and Acquisition) nonconcurred with the discussion on trailer modifications stating that the M871A1 trailers were modified because TACOM modified the M939 series of 5 ton tactical tractors. 12 - 14

Final Report Page No.

The Army stated that an effort was made to resolve the problem with TACOM but the TACOM solution, developing a unique commercial trailer, was unacceptable.

The Army stated that a TACOM solution could not have been implemented during the 2 years between the discovery of the height problem and the date of the modification. The support for this statement is that during that timeframe Army user requirements were revalidated, Army users rejected substitution of alternative equipment and TACOM's commercial trailer, a limited transportability test plan was prepared, and a modification contract was prepared and awarded.

The Army stated that every effort was made to ensure the transportability of the modified trailers by requiring the contractor to conduct various road tests. Additionally, the capability of the modified trailers to meet system requirements was demonstrated by deploying them to Germany. The JSIPS program manager provided comments similar to those provided by the Army.

Audit Response. The trailer modifications resulted from a TACOM modification of the M939 series 5 ton tactical tractor after the original coordination between the Army program manager for JSIPS and TACOM. A statement has been added to this report to reflect the series of events.

The JSIPS trailer modifications were necessary to resolve the height problem. However, TACOM is responsible for ensuring that supportability and readiness of the trailer is maintained. TACOM should have been advised of the modifications to the trailers so they could have determined the adequacy of testing to ensure transportability.

15 **Management Comments.** Page 16: The Department of the Army Product Manager, Special Operations Aircraft, stated that the organizational relationships shown in the draft report were incorrect.

Audit Response. The final report was revised to show the correct organizational relationships.

15 **Management Comments.** Page 17: The Air Force Deputy Chief of Staff (Logistics) stated that the draft report statement beginning with "ATTLA conducts maximum...." should be changed to read:

> If ATTLA deems a maximum density test loading necessary prior to aircraft certification that recommendation is forwarded to AMC/TEA [Air Mobility Command, Mobility Test and Evaluation Division Headquarters]. ATTLA then provides to the USAF [United States Air Force] Mobility Center Test Director on-site engineering support for such tests to determine the most efficient use of aircraft space.

Test loadings are technically under the control of Headquarters Air Mobility Command, Mobility Test and Evaluation Division. The Air Force believes that the change will accurately portray ATTLA's roles and responsibilities.

Audit Response. The final report was revised to state that ATTLA is responsible for determining whether maximum density test loadings are necessary before aircraft certification.

Management Comments. Page 17: The Department of the Army Product Manager, Special Operations Aircraft, stated that the prototype aircraft load test on the C-5 was intended to, and did, identify transportability configuration shortcomings such as towing difficulties, antenna interference, and fuel spillage. Accordingly tow plates were added during the production phase. It was decided that the fuel spillage from the external tanks could be accomplished at one-fourth the cost after delivery vice having the prime contractor change this during the production. Rather than delay the initial delivery and training plans the retrofit of the fuel probe disconnect shut off kits were deferred to a later date since fuel probe removal is not a routine function. It should be noted that this type nuisance problem has been present on the MH-60K model aircraft in the field over the past several years. However, to improve environmental considerations the problem will be addressed. The joint decision was made to defer the antenna modification until a Pre-Planned Product improvement could be properly resourced and accomplished. 15 - 16

Audit Response. The facts that the Army outlined clearly demonstrate why program managers should not proceed with major modifications of weapon systems until the transportability requirements are met. It is not possible to fix known transportability configuration shortcomings, such as the known fuel spill problem, when the prototype test load does not occur until 10 months after the program manager awards the prime contractor a modification contract to produce 11 MH-60K helicopters. Because the contract was already awarded any major deficiencies detected during the test loading cannot be corrected unless retrofits are performed. Transportability approval, to include the appropriate approval from ATTLA on the loading plans, should be obtained to avoid possible additional modifications.

Management Comments. Page 19: The Air Force Deputy Chief of Staff (Logistics) stated that the draft report sentence on the C-141 aircraft loading should include the words "refueling probe". Additionally, the Air Force stated that, "ATTLA has recommended a test loading to determine the required amount of approach shoring to prevent contacts with the ramp during loading" should be added. Further, the additions should be made to the report because both the radome and the refueling probe impose tight aircraft ramp and floor clearances. The radome was found to be less of a problem than the projection of the refueling probe based on desktop analysis. 17

Audit Response. The final report has been revised to show that the refueling probe and the radome impose tight aircraft floor and ramp clearances as depicted in the report. The report does state that ATTLA has recommended a

Final Report
Page No.

test loading to determine whether the radome would be crushed. However, our support data do not indicate that the purpose of the test loading is to determine the amount of approach shoring.

32 **Management Comments.** Page 24, (Appendix A): The Office of the Assistant Secretary of the Army (Research, Development, and Acquisition) stated that the AGS mission profile does not require the AGS to provide direct artillery support to dismounted infantry.

Audit Response. The AGS operational requirements document states that the AGS will be employed primarily in direct support of infantry units and is designed to provide firepower to forces deployed in support of operations where tanks are not available. The final report was revised to state that the AGS will provide firepower to forces deployed in support of operations where tanks are not available.

32 **Management Comments.** Appendix A: The Department of the Army Product Manager, Special Operations Aircraft, stated that transport of the MH-60K helicopter by C-17 aircraft is not stated in the required operational capability documents as a transportability requirement.

Audit Response. MTMC-TEA's Interim Transportability Engineering Analysis for the MH-60K, multi-mission helicopter, dated February 1990, stated that the MH-60K is required to be transported by C-17 aircraft. However, the report has been revised to reflect that transport C-17 is not required.

38 **Management Comments.** Page 30 (Appendix C): The Air Force Deputy Chief of Staff (Logistics) stated that Natick's responsibilities should be changed to clarify responsibilities for certification of material to be airdropped by fixed wing aircraft. Natick provides safe recovery certification for rigged configurations to be airdropped by fixed wing aircraft. However, ATTLA performs certifications of the rigged configuration loads to ensure that each configuration can be safely flown and extracted from the aircraft.

Audit Response. The final report was revised to show the detailed responsibilities of Natick and ATTLA.

38 **Management Comments.** Appendix C: The Air Force Deputy Chief of Staff (Logistics) stated that the Aeronautical Systems Center, Air Transportability Test Loading Agency, not the Air Force Materiel Command, Logistics Transportation Division, provides air transportability approvals to DoD users.

Audit Response. The final report was revised to state that Aeronautical Systems Center, Air Transportability Test Loading Agency provides air transportability approvals for all DoD users. The final report also states that Air Force Materiel Command, Logistics Transportation Division provides transportability approvals to Air Force agencies.

Appendix F. Summary of Potential Benefits Resulting from Audit

Recommendation Reference	Description of Benefit	Amount and/or Type of Benefit
1.a.	Internal Control. TRANSCOM will be responsible for verifying that transportability requirements are met.	Nonmonetary.
1.b.	Internal Control. Expedites the issuance of transportability guidance to clarify the transportability approval process.	Nonmonetary.
2.	Internal Control. Ensure that transportability requirements are met during the acquisition of major weapon and support systems.	Nonmonetary.
3.	Economy and Efficiency. Reduce the AGS procurement until its air transport requirements are met.	Funds Put to Better Use. Army Acquisition Executive could avoid spending about $186 million for the AGS Program if the AGS cannot meet its LVAD requirement. (Appropriation: 2132033 - Weapons and Combat Vehicles)
4.a.	Economy and Efficiency. Ensure that modified shelters can efficiently and effectively transport the JSIPS.	Nonmonetary.

Appendix F. Summary of Potential Benefits Resulting from Audit

Recommendation Reference	Description of Benefit	Amount and/or Type of Benefit
4.b.	Economy and Efficiency. Require that shelters are procured cost-effectively.	Funds Put to Better Use. JSIPS Program Offices could avoid spending about $1.6 million (Army $640,000, Air Force $640,000, Marine Corps $320,000) for shelter procurement. (Appropriations: 2152035 - Other Procurement Army, 5723080 - Other Procurement Air Force, 1751109 - Procurement Marine Corps)
5.	Economy and Efficiency. Ensure that JSIPS trailers can effectively and efficiently transport shelters.	Nonmonetary.
6.	Economy and Efficiency. Develop loading plans for the MH-60K helicopter before performing modifications.	Funds Put to Better Use. The U.S. Special Operations Command could avoid spending about $350,000 for quick dry disconnect modifications. (Appropriation: 97201001 - Operation and Maintenance Defense Agencies)
7.	Economy and Efficiency. Cancel the Pave Hawk helicopter modifications unless it cannot be transported in a C-141 aircraft.	Funds Put to Better Use. The Air Force could avoid spending about $4.4 million to retrofit modified aircraft. (Appropriation: 5703010 - Aircraft Procurement Air Force)

Appendix G. Organizations Visited or Contacted

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition, Washington, DC
Assistant Secretary of Defense (Production and Logistics), Washington, DC
Assistant Secretary of Defense (Program Analysis and Evaluation), Washington, DC
Director, Operational Test and Evaluation, Washington, DC
Deputy Under Secretary of Defense (Logistics), Washington, DC

Department of the Army

Office of the Under Secretary of the Army (Operations Research), Washington, DC
Office of the Assistant Secretary of the Army (Research, Development, and Acquisition), Washington, DC
Office of the Inspector General, Washington, DC
Office of the Deputy Chief of Staff (Logistics), Washington, DC
Forces Command, Ft. McPherson, GA
XVIII Airborne Corps, Ft. Bragg, NC
Training and Doctrine Command, Ft. Monroe, VA
Armor Center, Ft. Knox, KY
Quartermaster Center and School, Ft. Lee, VA
Army Materiel Command, Alexandria, VA
Tank-Automotive Command, Warren, MI
Army Aviation Troop Command, St. Louis, MO
Natick Research, Development, and Engineering Center, Natick, MA
Materiel Systems Analysis Activity, Aberdeen Proving Ground, MD
Operational Test and Evaluation Command, Alexandria, VA
Test and Experimentation Command, Ft. Bragg, NC
Armored Systems Modernization Program Executive Office, Warren, MI
Army Space Program Office, Merrifield, VA
Topographic Engineering Command, Ft. Belvoir, VA

Department of the Navy

Office of the Assistant Secretary of the Navy (Research, Development, and Acquisition), Washington, DC
Office of the Deputy Chief of Naval Operations (Logistics), Washington, DC
Naval Air Systems Command, Washington, DC

Department of the Air Force

Office of the Assistant Secretary of the Air Force (Acquisition), Washington, DC
Office of the Deputy Chief of Staff (Logistics), Washington, DC
Air Force Materiel Command, Wright Patterson Air Force Base, OH

Department of the Air Force (cont'd)

Electronic Systems Division, Hanscom Air Force Base, MA
Aeronautical Systems Division, Wright Patterson Air Force Base, OH
Air Logistics Center, Warner Robins Air Force Base, GA
Special Operations Command, Hurlburt Field, FL
Air Force Operational Test and Evaluation Center, Albuquerque, NM

Marine Corps

Office of the Deputy Chief of Staff (Installations and Logistics), Arlington, VA
Marine Corps Systems Command, Quantico, VA

Other Defense Organizations

U.S. Transportation Command, Scott Air Force Base, IL
Military Management Traffic Command, Falls, Church, VA
Transportation Engineering Agency, Newport News, VA
Air Mobility Command, Scott Air Force Base, IL
Defense Plant Representative Office, FMC Corporation, San Jose, CA

Contractor

FMC Corporation, San Jose, CA

Appendix H. Report Distribution

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition and Technology
Assistant Secretary of Defense (Program Analysis and Evaluation)
Assistant to the Secretary of Defense for Public Affairs
Comptroller of the Department of Defense
Director, Operational Test and Evaluation
Deputy Under Secretary of Defense (Logistics)

Department of the Army

Secretary of the Army
Assistant Secretary of the Army (Installations and logistics)
Office of the Under Secretary of the Army (Operations Research)
Office of the Assistant Secretary of the Army (Research, Development, and Acquisition)
Auditor General, U.S. Army Audit Agency
Office of the Deputy Chief of Staff (Logistics)
Commander, U. S. Army Forces Command
Commander, U.S. Army XVIII Airborne Corps
Headquarters, U. S. Army Training and Doctrine Command
Commander, U. S. Army Armor Center
Headquarters, U. S. Army Materiel Command
Commander, U. S. Army Tank-Automotive Command
Army Aviation Troop Support Command
Commander, U. S. Army Natick Research, Development, and Engineering Center
Armored Systems Modernization Program Executive Office
Commander, U. S. Army Space Program Office

Department of the Navy

Secretary of the Navy
Assistant Secretary of the Navy (Financial Management)
Auditor General, Naval Audit Service

Department of the Air Force

Secretary of the Air Force
Assistant Secretary of the Air Force (Acquisition)
Assistant Secretary of the Air Force (Financial Management and Comptroller)

Department of the Air Force (cont'd)

Auditor General, Air Force Audit Agency
Office of the Deputy Chief of Staff (Logistics)
Air Force Materiel Command
Commander, U. S. Air Force Electronic Systems Center
Commander, U. S. Air Force Aeronautical Systems Center
Commander, U. S. Air Force Air Logistics Center
Air Force Operational Test and Evaluation Center

Defense Organizations

Commander in Chief, U.S. Transportation Command
Commander, U. S. Military Traffic Management Command Transportation Engineering Agency
Commander, U. S. Air Mobility Command
Commander in Chief, U.S. Special Operations Command
Commander, Defense Plant Representative Office, FMC Corporation

Non-Defense Federal Organizations

Office of Management and Budget
U.S. General Accounting Office
National Security and International Affairs Division, Technical Information Center
National Security and International Affairs Division, Defense and National Aeronautics and Space Administration Management Issues
National Security and International Affairs Division, Military Operations and Capabilities Issues

Chairman and Ranking Minority Members of each of the following Congressional Committees and Subcommittees:

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

Part IV - Management Comments

Deputy Under Secretary of Defense (Logistics) Comments

Final Report Reference

OFFICE OF THE UNDER SECRETARY OF DEFENSE

WASHINGTON, DC 20301-3000

ACQUISITION

August 30, 1993

(L/TP)

MEMORANDUM FOR DOD INSPECTOR GENERAL
THRU: CHIEF, CAIR, PI, OUSD(A) 1 Sept 93

SUBJECT: Comments to the Draft Audit Report on the Transportability of Major Weapon and Support Systems (Project No. 2LC-5023)

We have reviewed the subject Department of Defense Inspector General (DoDIG) draft report and do not concur with all of its recommendations.

This office agrees with the DoDIG that transportability roles, responsibilities, and the approval process for obtaining transportability certification during the acquisition cycle must be clarified. Accordingly, DoD Instruction 5000.2 and DoD Directive 4510.XX will be appropriately revised.

We partially concur with the DoDIG recommendation that shelters for the Joint Services Imagery Processing System be certified for air movement. The modified shelters with trailers have recently passed transportability tests and modification approvals are being obtained.

We do not concur with the DoDIG recommendations concerning the retrofit of MH-60K and Pave Hawk helicopters. The Army's MH-60K has approved load plans which accommodate planned retrofits to its fuel system and antenna. And finally, the Air Force Pave Hawk modification is being conducted primarily to improve its operational effectiveness, which also produces an added benefit by improving its loading capability aboard C-141 aircraft.

Detailed comments on the recommendations are attached.

James R. Klugh
Deputy Under Secretary (Logistics)

Attachment

Final Report Reference

DRAFT REPORT ON THE AUDIT OF TRANSPORTABILITY OF MAJOR WEAPON AND SUPPORT SYSTEMS

PROJECT NO. 2LC-5023

RECOMMENDATIONS

RECOMMENDATION 1a: We recommend that the Deputy Secretary of Defense revise DoD Directive 5158.4 to make the U.S. Transportation Command responsible for certifying that transportability requirements are met for major weapon and support systems before low-rate initial production award, and production and major modification. 19

DOD RESPONSE: **Nonconcur.** Procurement--equipping and modernizing the force (to include meeting the transportability requirements), is clearly a Service responsibility. A Commander-in-Chief's responsibility is to identify requirements. The DoD Instruction 5000.2 should be the vehicle for enforcing transportability requirements. Rather than adding another layer in the process, it would be more efficient to require Program Executive Officers and Program Managers to comply with existing policies and procedures. Given the U.S. Transportation Command's mission under DoD Directive 5158.4, adding responsibilities that are part of the Services' "organize, train, and equip" mission under Title 10 is not appropriate. Furthermore, the U.S. Transportation Command is not assigned all transportation engineering activities involved in the acquisition process. As the DoD single manager for transportation, the U.S. Transportation Command will provide, through its executive agent, transportability assistance and analytical support to each of the Services as requested during the acquisition process. Certification of transportability should remain with the individual Services as a Title 10 responsibility.

RECOMMENDATION 1b: We recommend that the Deputy Secretary of Defense promptly issue DoD Directive 4510.XX, "Defense Transportation Engineering," to clarify transportability roles, responsibilities, and approval process for obtaining transportability certifications during the acquisition of major weapon and support systems. 20

DOD RESPONSE: **Partially concur.** While DoD concurs with the need to clarify transportability roles, responsibilities and the approval process for obtaining transportability certification during the acquisition of major weapon and support systems, we do not believe that DoD Directive 4510.XX, "Defense Transportation Engineering" is the correct document to achieve that end. The purpose of this directive is to establish a disciplined approach for conduct of

Final Report Reference

DoD transportation engineering, appoint an Executive Agency for related policy and issues, and establish a single DoD transportation engineering policy document. It is not intended to address, in detail, the specific approval process for obtaining transportability certification during the acquisition of major weapon and support systems. The DoD Directive 4510.XX has been revised and is currently being reviewed by the Services and DoD Components. Detailed guidance regarding specific implementation of the approval process for obtaining transportability certification is addressed in the Joint Service Regulation (Army Regulation 70-44, Office of the Chief of Naval Operations 4600.22B, Air Force Regulation 80-18, Marine Corps Order 4610.14C, and Defense Logistics Agency Regulation 4500.25). This joint regulation is currently undergoing revision and is expected to be circulated for comments by December 1993.

21

RECOMMENDATION 2: We recommend that the Under Secretary of Defense for Acquisition revise DoD Instruction 5000.2 to require that program managers not proceed to low-rate initial production award or major modification of weapon and support systems until transportability requirements are met.

DOD RESPONSE: **Concur.** The Under Secretary of Defense for Acquisition will revise DoD Instruction 5000.2 to require that program managers not proceed to low-rate initial production award or major modification of weapon and support systems until transportability requirements are met. This change will be part of a planned revision of DoD Instruction 5000.2, which is expected to be completed within the next six to eight months. It should be noted that the recent Joint Surveillance Target Acquisition Radar System Ground Station Module Defense Acquisition Board and resulting draft Acquisition Decision Memorandum demonstrates that DoD now routinely considers transportability in its acquisition management decisions (Attachment 1). Although the DoDIG concludes that transportability considerations are frequently overlooked in the acquisition process, the Commander, Military Traffic Management Command, U.S. Transportation Command's transportability executive agent, reports that the transportability program is significantly more effective and efficient today than in the past. While the revised DoD Instruction 5000.2, "Defense Acquisition Management Policies and Procedures," February 1991, changed the requirement for transportability approval from Milestone II to Milestone III, the Military Traffic Management Command's Transportation Engineering Agency responded to this shift of emphasis by changing the program focus from enforcement to developing a partnership with program managers. Transportability is now a cooperative effort among decision makers, materiel developers, equipment designers and users, and transporters. Lessons learned from the fielding of the M-1 tank

Final Report Reference

and recent equipment deployments have reinforced the fact that transportability is not only an Integrated Logistic Support element, but also a design element. To emphasize transportability early, the Army has made the Commander, Military Traffic Management Command, a member of the Army Systems Acquisition Review Council. All Services are seeking and receiving transportability engineering assistance from the Transportation Engineering Agency early in system design. Over the past year, efforts have been made to evaluate developing technologies that have potential for major improvements in systems transportability. Various transportability organizations are using Computer-Aided Design and Engineering tools to evaluate emerging technologies allowing transportability requirements to be modeled early in system design.

RECOMMENDATION 3: We recommend that the Army Acquisition Executive reduce the Armored Gun System planned procurement by about $186 million for 58 systems if the Armored Gun System cannot be successfully low-velocity airdropped from a C-130 aircraft; or if an alternative tactical aircraft that has demonstrated the capability to meet the Armored Gun System low-velocity airdrop mission will not be available to support Armored Gun System airdrop missions. 22

DOD RESPONSE: **Concur.** As a result of the source selection process, low-velocity airdrop is now a contractual requirement listed in the Army's exit criteria which must be demonstrated prior to low-rate initial production. The program manager will conduct a static airdrop test in April 1994 and a live airdrop in November 1994 from a C-130 aircraft. The Army low-rate initial production in-process review is scheduled for December 1994. The Office of the Assistant Secretary of the Army, Research, Development, and Acquisition response dated July 26, 1993, is at Attachment 2. While the Office of the Assistant Secretary of the Army, Research, Development, and Acquisition does not concur with portions of this report, they have, in fact, implemented procedures to ensure the system undergoes successful low-velocity airdrop testing before authorizing low-rate initial production.

RECOMMENDATION 4a: We recommend that the Joint Services Imagery Processing System program manager coordinate with the Air Force Shelter Management Office to verify that modified shelters can safely transport the Joint Services Imagery Processing System and be effectively supported in the field. 23

DOD RESPONSE: **Partially Concur.** Air movement certification was requested and approved through DoD channels. The Office of the

Final Report Reference

Assistant Secretary of the Army, Research, Development, and Acquisition response dated July 30, 1993, is at Attachment 3.

23 **RECOMMENDATION 4b:** We recommend that the Joint Services Imagery Processing System program manager coordinate with the Air Force Shelter Management Office to purchase the additional shelters needed.

DOD RESPONSE: **Concur.** Following coordination between the Joint Services Imagery Processing System program manager and the Air Force Shelter Management Office to ensure that transportability of the system is not placed at risk, the required number of shelters should be obtained. Modified shelters are preferred over Military Standard shelters because they can house more, thus reducing the number required (resulting in an estimated savings of one-million dollars). The most effective way of meeting system cost and schedule was the method used--contractor provided shelters. The Office of the Assistant Secretary of the Army, Research, Development, and Acquisition response dated July 30, 1993, is at Attachment 3.

24 **RECOMMENDATION 5:** We recommend that the Army Space Program Office, in conjunction with the Army Tank Automotive Command, verify that Joint Imagery Processing System trailers can safely transport the modified and overloaded shelters and that the trailers can be effectively supported in the field.

DOD RESPONSE: **Concur.** The Air Force Shelter Management Office will coordinate with the Army Tank Automotive Command to obtain an approved modification for the trailers that have already been modified. Initial coordination will occur in August 1993. The Office of the Assistant Secretary of the Army, Research, Development, and Acquisition response dated July 30, 1993, is at Attachment 3.

24 **RECOMMENDATION 6:** We recommend that the Commander, United States Special Operations Command develop, with the Air Transportability Test Loading Agency, the loading plans for the reconfigured MH-60K helicopter before performing the retrofits to the fuel system and antenna.

DOD RESPONSE: **Nonconcur.** Loading plans have always been an integral part of the program, even prior to initial development contract. These plans are updated as design, test results, and customer directions dictate. The program manager will continue to coordinate with the Air Transportability Test Loading Agency. Additional comments provided by the Department of the Army, Product Manager,

Final Report Reference

Special Operations Aircraft and the U.S. Special Operations Command are at Attachment 4.

RECOMMENDATION 7: We recommend that the Pave Hawk helicopter program manager cancel plans to spend about $4.4 million to retrofit the helicopter unless the Air Transportability Test Loading Agency determines that the Pave Hawk cannot be loaded onto the C-141 aircraft without the retrofit, and the Air Mobility Command states that the C-141 aircraft will be available to transport Pave Hawk helicopters. 25

DOD RESPONSE: **Partially concur.** The primary reason the Air Force intends to retrofit the Pave Hawk is to improve its operational capability and mission effectiveness (moving the radome from the side to the front improves its field of view). An added benefit of the retrofit relocation is to ease the loading of the Pave Hawk on C-141 aircraft, although the primary tactical deployment method uses the C-5 aircraft. The program manager will perform necessary studies and has coordinated with the Air Transportability Test Loading Agency for a test load of the helicopter. The Office of the Assistant Secretary of the Air Force (Acquisition) response is at Attachment 5.

Attachments

Final Report Reference

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
RESEARCH DEVELOPMENT AND ACQUISITION
103 ARMY PENTAGON
WASHINGTON DC 20310-0103

REPLY TO ATTENTION OF

SARD-SI

26 JUL 1993

MEMORANDUM FOR DEPARTMENT OF THE ARMY, OFFICE OF THE INSPECTOR GENERAL

SUBJECT: Draft Audit Report on the Transportability of Major Weapon and Support System (Project No. 2LC-5023)

Reference, SAIG-PA memorandum, 3 June 1993, subject as above.

22 We have reviewed the draft audit report regarding the Army's Armored Gun System (AGS) (Recommendation 3, page 22).

The Army nonconcurs with the findings regarding the AGS program. The attached enclosure reflects the Army's position.

Enclosure

FOR RONALD V. HITE BG, USA
Major General, GS
Deputy for Systems Management

ATTACHMENT 1

Final Report Reference

ATTACHMENT

We have reviewed the draft Audit Report on the Transportability of Major Weapon and Support Systems (Project No. 2LC-5023), 2 June 1993 and nonconcur with the findings. Comments to specific paragraphs concerning the AGS are as follows:

1. Report, Page 3, Internal Controls, second sentence states: "Internal control policy guidance and procedures were generally insufficient to ensure that program managers met transportation requirements before low rate initial production award or award for major modification of systems." We nonconcur with the finding with respect to the Armored Gun System (AGS) for the following reasons: 3

a. Transportability is an integral part of the AGS program. Status and progress of transportability development and planning for test are reviewed during regularly scheduled Technical Reviews, Test Integration Working Group (TIWG) meetings and Management Reviews. Engineering and Manufacturing Development (EMD) exit criteria were established for transportability in the Acquisition Program Baseline and in the 8 OCT 92 DA approved Test and Evaluation Master Plan (TEMP). Also, the AGS Critical Operational Issues & Criteria (COIC) include LVAD (Figure 1 in the AGS TEMP). Therefore, internal controls are in place concerning the overall program (to include transportability).

b. All transportability requirements and issues that may arise are coordinated and resolved between transportability representatives from the contractor, PM AGS, MTMC and Natick (as

Final Report Reference

~~transportability representatives from the contractor, PM AGS, MTMC and Natick (as~~ required).

6 2. Report, Page 6, Transportability, fourth sentence states: "About $186 million could be spent for 58 AGS vehicles without ensuring that the AGS can be airdropped from a C-130 aircraft; .." We nonconcur with the finding with respect to the AGS for the following reasons:

a. The AGS is currently in the EMD phase of the program. Information concerning AGS LVAD will be prepared to satisfy the transportability exit criteria of the Acquisition Program Baseline and COIC.

b. There will be no production funds obligated for Low Rate Initial Production (LRIP) until all exit criteria (to include C-130 LVAD) are satisfactorily addressed and decided on by the DA IPR board.

7 3. Report, Page 7, paragraph one states: "Streamlined acquisition guidance has made transportability roles and oversight responsibilities unclear. Previous guidance identified a focal point within each Service, responsible for ensuring that transportability was fully considered during the acquisition process. Additionally, the lack of regulation ...". We nonconcur with the finding with respect to the AGS for the following reasons:

a. Organizations (PM AGS, MTMC, Natick, etc.) that have interest in AGS transportability have undertaken active roles and responsibilities in the overall AGS transportability program (to include C-130 LVAD).

Final Report Reference

b. Organizations responsible for air transportability (PM AGS, MTMC, Natick) are fully competent and cognizant of their roles and responsibilities and how to do their jobs. Overregulation leads to stagnation and waste of precious budget funds. It often takes away opportunities to accomplish tasks in the most expeditions/cost effective ways.

4. Report, Page 9, first complete paragraph you state: "Under DoD's streamlined acquisition process, transportability requirements, a critical element in the acquisition process, were not effectively met for the three systems audited, which have an estimated acquisition cost of $3.4 billion. The program managers for the audited systems were not adequately considering the transportability of the systems during the acquisition process." We nonconcur with the finding with respect to AGS for the following reasons: 8

a. Transportability has been an integral part of the AGS Acquisition Process and was a critical factor in structuring and the ultimate approval of the acquisition strategy. During the Source Selection process, transportability was a major factor that was evaluated. In fact, it was evaluated as the most important factor under system performance. System performance was the most important element in the technical area. Technical was the most important area evaluated in the selection process. Please find enclosed tables M-1 and M-2 that define the overall evaluation criteria used in the selection process, evaluation criteria from the technical area and their order of importance.

Final Report Reference

b. The Military Management Traffic Command (MTMC) was an active member of the AGS Source Selection Evaluation Board. Criteria such as, length, width, height, weight, Center of gravity, tip-off curve, design integrity, suspension, tiedown and extraction provisions, etc., were considered. MTMC's analysis, review of data and concurrence was a critical element in the selection process to proceed to the EMD phase for the AGS.

c. MTMC and Natick Research, Development and Engineering Center are active members in the design phase of the AGS. They participate and are aware of all efforts being conducted in the area of transportability. An interim transportability Engineering Analysis was prepared for the XM8 Armored Gun System (AGS) by MTMC (dated November 1992) based on the latest available information at the time of report preparation. The cover letter states "At armor Level I, the AGS meets dimensional and weight requirements for low velocity air drop (LVAD) for C-130 and C-17 aircraft." The weight of the Level I armor AGS will be addressed later in this memorandum.

9 5. Report, Page 9, second complete paragraph states: "The Army was planning to buy 58 AGSs in late 1994, at a cost of about $186 million. However, it had not achieved a design that would make the AGS capable of being low velocity air dropped (LVAD) from available tactical aircraft. Acquisition guidance did not provide adequate internal controls to ensure that he AGS will meet the LVAD requirement from available tactical aircraft before the system proceeds into low rate initial production award. As a result, the Army may spend about $186 million procuring 58 AGS

vehicles that may not meet mission needs because they are too heavy to be air dropped." We nonconcur with the finding with respect to the AGS for the following reasons:

a. The contractor (FMC) proposed and is currently under contract to meet C-130 LVAD at Level I armor weight. The vehicle at Level I armor weight includes On Vehicle Equipment (OVE), on board fuel for 160 km, 10 main gun rounds, 1000 coax rounds and 100 M2 ready rounds which are required for LVAD.

b. The EMD phase of the program is to finalize the vehicle design and solve unforeseen problems (weight increase of the Level I armor vehicle is one such unforeseen problem). That is why the weight reduction program was put in place after the problem was identified. The goal of the program is to meet the vehicle weight requirement for C-130 LVAD (with the OVE and consumables) of 35,630 lbs and an overall C-130 LVAD package weight of 42,000 lbs or less which includes the airdrop pallet, parachutes and rigging.

c. We are working with Natick in evaluating a modified Type V platform that would reduce the platform weight. Natick Airdrop Systems Division performed the initial analysis, an actual racking test, roller load test and static drop test during December 1992 through January 1993 with favorable results. The test report is available upon request. Actual airdrop testing of the modified Type V platform with weight tubs simulating an approximate vehicle weight of 37,000 lbs is being performed at Yuma Proving Grounds, AZ during the week of 12 July 1993 with Natick observing the test.

Final Report Reference

d. An actual static drop test with an AGS will be performed by Natick RD&E Center during Apr 1994 to provide information for the DA IPR and LRIP contract award decision. According to Natick RD&E center, favorable static drop test results provide a high confidence level that the actual airdrop should not surface any unsolvable problems. This testing is documented on page 3C of the DA approved AGS TEMP.

e. A single airdrop test will be performed during the planned Early User Test and Experimentation (EUT&E) (prior to or during Nov 94) to provide information for the DA IPR and LRIP contract award decision process. Page 3A from the DA approved AGS TEMP shows scheduling of an LVAD test to support the LRIP IPR decision. Also, the TEMP, Page 4, para C(1) states that transportability by tactical aircraft is an exit criteria in the Acquisition Program Baseline for the EMD phase.

9

6. Report, Page 9, 3rd complete paragraph states: "The milestone II approval for entry into low rate initial production was given in May 1992. A low rate initial production contract ... is scheduled in November 1994." We nonconcur with these statements for the following reasons: Milestone II approval in May 92 was for entry into EMD. A DA IPR is planned for Dec 94 to approve the LRIP decision. After the DA IPR the LRIP contract would be awarded, also in Dec 94.

10

7. Report, Page 10, second complete paragraph, fifth sentence states: "Although the PEO has target weight reductions, officials at the Army Natick Research, Development, and Engineering Center, which certifies equipment for airdrop, stated

Final Report Reference

that the AGS would probably grow in weight because of modifications or the need to airdrop with increased fuel and ammunition." We nonconcur with the findings with respect to the AGS for the following reasons:

The C-130 overall LVAD package weight (to include the vehicle, platform, rigging materials, OVE, consumables, etc.) will be maintained at 42,000 lbs or less. Any "new" requirements affecting weight will be assessed on a case-by-case basis and traded-off for weight in other areas to assure that the overall C-130 LVAD package of 42,000 lbs is not violated.

8. Report, Page 11, first complete paragraph, third sentence states: "Although the C-130 LVAD requirement was included in the AGS contract, the PEO was not scheduled to receive transportability certification for the AGS before low rate initial production award, and did not schedule a C-130 LVAD test to support the decision in the AGS test and evaluation master plan." We nonconcur with the findings with respect to the AGS for the following reasons: Testing is scheduled as described in item 5 above (to include static drop testing during Apr 94 and air drop testing during EUT&E) that will provide the DA IPR board adequate information on C-130 LVAD to be able to make a proper decision. Therefore, there are internal controls in place to assure that all the exit criteria called for in the Acquisition Program Baseline are addressed. 10

9. Report, Page 22, paragraph 3 states: "We recommend that the Army Acquisition Executive reduce the Armored Gun System planned procurement by about $186 million for 58 systems if the 21

Final Report Reference

Armored Gun System cannot be successfully low velocity air dropped from a C-130 aircraft; or if an alternative tactical aircraft that has demonstrated the capability to meet the Armored Gun System low velocity air drop mission will not be available to support Armored Gun System airdrop mission." We nonconcur with the findings with respect to the AGS for the following reason:

There are adequate planned tests and evaluations to address the ability of the AGS to comply with the C-130 LVAD requirement prior to the DA IPR and LRIP contract award. Non compliance with air transportability by tactical aircraft would jeopardize the entire program, not only the 56 vehicles mentioned.

32 10. Report, Page 24, paragraph 1 states: "The AGS will provide direct artillery support to dismounted infantry during contingency operations and will be used in airdrop and forced entry operations when deployability is essential." We nonconcur with this statement for the following reason: The AGS mission profile does not require the vehicle to provide direct artillery support to dismounted infantry.

Encl

TABLE H-2

EVALUATION CRITERIA
TECHNICAL AREA

ELEMENTS	SYSTEM PERFORMANCE	FIREPOWER	AUTOMOTIVE CHARACTER-ISTICS	PRODUCT ASSURANCE TEST & EVALUATION	PRODUCIBILITY	SYSTEM ANALYSIS
FACTORS	TRANSPORTABILITY SURVIVABILITY GENERAL DESIGN SOFTWARE	WEAPONS SYSTEMS FIRE CONTROL	PERFORMANCE DESIGN	RAM TEST O&A		PREPLND PRODUCT IMPROVE-MENT ANALYSIS APPROACH

ORDER OF IMPORTANCE. FACTORS WITHIN EACH ELEMENT ARE SHOWN IN DESCENDING ORDER OF IMPORTANCE WITH THE EXCEPTION OF FIREPOWER FACTORS WHICH ARE ESSENTIALLY EQUAL. THERE ARE NO FACTORS UNDER THE ELEMENT OF PRODUCIBILITY.

TABLE H-1

EVALUATION CRITERIA

AREAS	TECHNICAL	LOGISTICS	MANPRINT	PAST PERFORMANCE	COST	MANAGEMENT & PRODUCTION	SCHEDULE ENHANCEMENT
ELEMENTS	• SYSTEM PERF	• ILS MGT	• OPERATIONAL		• REALISM/	• PROGRAM	• SCHEDULE/
	• FIREPOWER	• LSA	SUITABILITY		REASON-	EXECUTION	PROGRAM
	• AUTOMOTIVE	• LCC INCLUDE	• MANPRINT		ABLENESS/	• MGMT SYS	RISK
	CHARACTER-	• STANDARDI-	INTEGRATION		AFFORD-		
	ISTICS	ZATION			ABILITY		
	• RMSS				• BUDGETARY		
	• PRODUCIBILITY				PRODUCTION		
	• SYSTEM ANAL				ESTIMATE		

ORDER OF IMPORTANCE: AREAS: THE TECHNICAL AREA IS OF PARAMOUNT IMPORTANCE AND IS SOMEWHAT MORE IMPORTANT THAN LOGISTICS, MANPRINT, AND PAST PERFORMANCE AREAS COMBINED. THE LOGISTICS, MANPRINT, PAST PERFORMANCE, COST, MANAGEMENT & PRODUCTION, AND SCHEDULE ENHANCEMENT AREAS ARE IN DESCENDING ORDER OF IMPORTANCE.

ELEMENTS: IN THE TECHNICAL AREA, THE FIRST FIVE ELEMENTS ARE IN DESCENDING ORDER OF IMPORTANCE WITH THE LAST TWO ELEMENTS BEING ESSENTIALLY EQUAL TO EACH OTHER. IN THE LOGISTICS AREA THE ELEMENTS ARE ESSENTIALLY EQUAL IN IMPORTANCE. IN THE MANPRINT AREA, OPERATIONAL SUITABILITY IS SIGNIFICANTLY MORE IMPORTANT THAN MANPRINT INTEGRATION. IN THE COST AREA, REALISM/REASONABLENESS/AFFORDABILITY IS MORE IMPORTANT THAN BUDGETARY PRODUCTION ESTIMATE. IN THE MANAGEMENT & PRODUCTION AREA, PROGRAM EXECUTION IS SLIGHTLY MORE IMPORTANT THAN MANAGEMENT SYSTEMS.

Final Report Reference

RESPONSE TO DOD IG DRAFT AUDIT REPORT (PROJ NBR 2LC-5023)

SUBJECT: Joint Services Imagery Processing System (JSIPS)

1. Nonconcur with the estimated monetary benefit of $1.6 million within the JSIPS program. The rationale for the estimated monetary benefit as stated on page 13 of the draft audit report is not clear. It implies that money could be saved by procuring shelters through the Aviation Troop Support Command (ATSCOM); however, it does not indicate that ATSCOM could provide shelters that would meet the specified weight capacity requirement for the JSIPS. The cost and weight capability of the JSIPS and the Military Standard (MilStd) shelters must be consistent. A JSIPS 8X8X20 foot shelter can weigh 20,000 lbs, while a 8X8X20 foot MilStd shelter can weigh 11,180 lbs. Therefore, it would take twice as many MilStd shelters to meet the JSIPS weight requirement. If this is the case, the JSIPS program manager can purchase 28 shelters for $4.2 million while the item manager must purchase 56 shelters for $5.2 million. When considered in this manner, the JSIPS program should be recognized for their efforts to save the government $1 million rather than costing $1.6 million as stated in the draft audit report. The use of MilStd shelters has other implied costs that are not identified. Twice as many shelters requires twice as many trucks and trailers or mobilizers. This dramatically increases the user's air/sea lift requirement for deployment. The most effective way of meeting system cost and schedule was the method used - contractor provided shelters. 12

2. Nonconcur with the trailer modification background material cited on pages 14 and 15 of the draft audit report. 12 - 14

a. The M871A1 trailer required a modification because of an Army Tank and Automotive Command (TACOM) modification of the M939 series of 5 Ton tactical tractors. A nine inch increase of fifth wheel height on the tractor caused the JSIPS tractor /trailer / shelter combination to exceed the European bridge height requirement. When confronted with this problem, TACOM representatives stated that they had no Army requirement to transport 20 foot ISO shelters in Europe. TACOM representatives did indicate that they could develop a special trailer for the Army JSIPS, but it would be a unique commercial item and it would not meet the JSIPS contract required Government Furnished Equipment (GFE) delivery schedule. M871A1 trailers were designed to transport 22 1/2 tons of cargo, the modified M871A1 is required to transport half of that amount. M871A1 trailers are supportable throughout the Army, unique commercial trailers are not.

Final Report Reference

SUBJECT: Joint Services Imagery Processing System (JSIPS)

b. The draft audit report implies that a TACOM solution could have been implemented during the two years that elapsed between the discovery of the height problem and the date of the modification contract award. This is not the case. During the two year period:

(1) Army user requirements were revalidated,

(2) substitution of alternative equipment was recommended and rejected by the Army users,

(3) TACOM's commercial trailer proposal was considered and rejected.

(4) a limited transportability test plan and the Request for Proposal (RFP) for the modification contract was prepared,

(5) the competitive contract was announced,

(6) the contract was awarded at the conclusion of the source selection process.

c. Every effort was made to ensure that the modified trailers were safe and transportable. The modification contractor was required to conduct a limited improved road, unimproved road and cross country test while loaded with 20,000 lbs on the trailer bed and 3,000 lbs on the gooseneck platform. No design or workmanship flaws were identified as a result of this test.

d. An air movement certification was requested and approved through DOD channels. The Army JSIPS was deployed to Germany on U. S. Air Force C-5 and C-141 aircraft, demonstrating that it met those system requirements.

24

3. Concur with Recommended Corrective Action Number 5 cited on page 22 of the draft audit report.

a. ASPO will work with TACOM to get an approved modification for the trailers that have already been modified. We intent to complete the initial coordination with TACOM by 30 August 1993.

b. ASPO is working with TACOM to develop and build trailers for future Army JSIPS. TACOM is reviewing the description of the required trailers. This was provided to them in late May of this year. The funding and fielding schedule of future Army JSIPS will determine the completion date of this action.

2

DEPARTMENT OF THE ARMY
PRODUCT MANAGER, SPECIAL OPERATIONS AIRCRAFT
4300 GOODFELLOW BOULEVARD, ST. LOUIS, MISSOURI 63120-1798

REPLY TO ATTENTION OF

02 JUL 19

SFAE-AV-SOA

MEMORANDUM FOR COMMANDER, UNITED STATES SPECIAL OPERATIONS COMMAND, ATTN: SOAE-MR (CAPTAIN ROBERT R. HANKE), MACDILL AIR FORCE BASE, FL 33621-5323

SUBJECT: Draft Audit Report on the Transportability of Major Weapon and Support Systems (Project No. 2LC-5023)

1. Review of subject report has produced the following general observations:

a. The DOD-IG had 122 programs to choose from for this study -- why did they select the MH-60K in such a restricted sample size of only three programs, when this program's acquisition strategy dictates concurrency? With concurrency it would be impossible to do a full-up transportability demonstration prior to a limited production decision. Under the circumstances we prudently used analytical data and experience from the MH-60L program to assure that the required number of MH-60Ks could be loaded on the C-5. This was done prior to making the limited production decision. We backed this analysis up with a transportability demonstration with a prototype MH-60K, after the production decision. During this demonstration we noted the fuel spillage, towing, and antenna problems. We have solved the towing problem with the production incorporation of tow plates and the fuel spillage is being corrected with a self-closing connector kit. The antenna interference is a nuisance problem which will be corrected at a later date.

b. The key points are:

- There was a active transportability plan in place before the production decision.
- As required up to six MH-60Ks can be loaded in the C-5 with the external tanks and fuel probes removed.
- With tanks and probes installed lessor quantities of MH-60Ks can be loaded in the C-5.
- We did not meet the required loading times by 17 minutes We beat the required unload time by 27 minutes. We will meet the loading time requirement with the tow plates and fuel kit modifications installed.

Final Report Reference

02 JUL 1993

SFAE-AV-SOA
SUBJECT: Draft Audit Report on the Transportability of Major Weapon and Support Systems (Project No. 2LC-5023)

2. The following comments are directed at specific areas of the report:

i a. Page i. Audit Results:

(1) It is stated that transportability of systems was not being adequately considered during the acquisition of major weapon and support systems. However, the report describes the prototype transportability tests, design fixes, and certifications from MTMC and ATTLA which were accomplished for the MH-60K. If these actions were not adequate the authors should give specific recommendations rather than non-accountable implications that transportability was not considered.

(2) If an item is being certified to be transported in another vehicle, e.g., the C-5, the certification of acceptability should be from the cognizant office for that vehicle, e.g., ATTLA. The audit recommendation of creating another central agency for this determination is wasteful organizational layering which the DOD is trying to eliminate rather than promote. Policing of these actions is accomplished in the milestone review process. If the leadership in those reviews made a decision to address transportability in a certain way the audit should verify the execution of that decision rather than second guessing the basic decision.

i b. Page i. Internal Controls: The program managers are responsible to the milestone authority and the customer to execute the program within approved technical and resource constraints. During the conduct of the program, trade-offs must be reached as agreed to by the materiel developer and the combat developer. The audit report fails to recognize this most basic foundation of the acquisition process. At the milestone review the leadership recognized the transportability questions which surfaced in the development study. Accordingly, they added the prototype demonstration requirement. However, they concluded there was adequate time to incorporate fixes to the questionable areas during production without holding up the initial production activities.

i c. Page i. Potential Benefits of Audit: A basic part of any purported benefit must be the cost of implementation However, the report has overlooked these essential cost elements in arriving at the estimated benefits of $192M for the audit recommendations. In the case of the MH-60K, nothing in the recommendations would have avoided the purported $350K of unnecessary fuel system modifications.

Final Report Reference

02 JUL 1993

SFAE-AV-SOA
SUBJECT: Draft Audit Report on the Transportability of Major Weapon and Support Systems (Project No. 2LC-5023)

Certainly the modifications accomplished at that price are preferable to the cost (time and money) of contracting with the aircraft manufacturer for the modifications (in excess of $1M in direct costs required by the aircraft manufacturer plus extending the acquisition cycle at a program cost of $2M to $3M per month for six months).

d. Page ii. Summary of Recommendations: The report recommends that MH-60K loading plans be developed. Loading plans have been a basic part of the program since prior to the initial development contract. These plans are updated as design and test results and customer directions dictate. Copies of this documentation were previously furnished to the report's authors. i

e. Page 3. Scope: The report states that the acquisition cycle consists of five major milestones (page 2. par. 3) and then states that three systems were judgmentally selected (page 3. par. 2) out of 122 candidates. Since judgement was ostensively used, that sampling criteria should be subject to open scrutiny of the statistical process used, in that it forms the basis for the subsequent generic recommendations for changes to the DOD process. Without suitable explanation, the reader must conclude that all the selected systems had the common strategy to follow the complete milestone model. However, at least in the case of the MH-60K, the approved acquisition strategy began with Milestone II, and was structured as a Non Development Item, Category III, Limited Procurement - Urgent, Non Major Program, with streamlined concurrent engineering. This was based on the fact that the fundamental aircraft was a standard UH-60 airframe, and the selected modifications were urgently needed by the Special Operations Forces. While the Secretary of the Army certified to congress that there were risks associated with this approach, those risks were considered acceptable. The alternative was to follow the classical milestone model which would add 36 months at $2M to $3M per month to the program. It was also recognized that full user participation would be incorporated through-out the acquisition process. This by definition means that continuous improvements (engineering changes) would be accomplished both in the production phase and by retrofit actions. Subsequently, during the production phase the program was redesignated as an ACAT II program due to cancellation of the V-22 program, thus raising the MH-60K program costs above the DOD threshold for non-major programs. 3

3

Final Report Reference

02 JUL 1993

SFAE-AV-SOA
SUBJECT: Draft Audit Report on the Transportability of Major Weapon and Support Systems (Project No. 2LC-5023)

3 f. Page 3. Internal Controls: While congress and DOD leadership are constantly directing that the acquisition process be streamlined and authority and responsibility be focused at the lowest level, the IG culture cannot break out of its classical mold of thinking that the solution to all problems lays in elevating actions to the highest level. There is no justification provided in the report for the recommended additional controls, nor is the source of additional resources to implement such a concept stated. It is believed the current law requires any new legislation to identify the source of funds to implement the proposed change. Regarding the purported benefits of $192M, see comments in paragraph 2.c. above for the $350K portion of that amount allocated to the MH-60K.

7 g. Page 7. Transportability Roles and Responsibilities: The report states there is a lack of focal points for responsibility and authority for streamlined acquisition in the Services or Unified Commands. However, at least in the case of the MH-60K and every other case to our knowledge, the same focal points and milestone reviews are utilized in the streamlined acquisition process as those used in the conventional process. Streamlining does not eliminate steps, it only recognizes that some steps can be more effectively and efficiently accomplished concurrently. In both the sequential and streamlined process there will be problems and trade-offs to be resolved. However, the decisions must be made on a program global basis through team work of all participants.

14 h. Page 16. Procurement Status: The report recommends changes in the DOD organization while demonstrating a total lack of understanding of the current organization. It refers to the "Army Materiel Command Program Executive Office - Special Operations Aircraft Branch". The Army Materiel Command (AMC) is not in the reporting chain of the Program Executive Office (PEO). The PEO-Aviation reports directly to the Army Acquisition Executive/ASARDA, not AMC. The PEO has no SOA Branch. The Special Operations Aircraft Product Manager (SOA PM) is assigned to the US Army Special Operations Command (USASOC), and is under the operational control of the PEO-AV. USASOC is assigned to US Special Operations Command (USSOCOM). The SOA Program is planned and executed as a team which includes direct participation by leadership from, among others, all of the above organizations.

4

Final Report Reference

02 JUN 1993

SFAE-AV-SOA
SUBJECT: Draft Audit Report on the Transportability of Major Weapon and Support Systems (Project No. 2LC-5023)

i. Page 17. MH-60K Planned Retrofits: The report has confused a variety of facts concerning transportability modifications. The prototype aircraft load test on the C-5 was intended to identify transportability configuration shortcomings. It did identify towing difficulties, antenna interference and fuel spillage. Accordingly, added tow plates were incorporated during the production phase. It was decided that the fuel spillage from the external tanks could be accomplished at one fourth the cost after delivery vice having the prime manufacturer change this during production. This was an approved Value Engineering Proposal (VEP). Rather than delay the initial delivery and pilot training plans the retrofit of the fuel probe disconnect shut-off kits were deferred to a later date since fuel probe removal is not a routine mission function.
It should be noted that this nuisance type problem has been present on MH-60L model aircraft in the field over the past several years. However, to improve environmental considerations the problem will be addressed. In the balance of resources versus need for mission capability, the joint decision was to defer the antenna modification until a Pre-Planned Product Improvement (P3I) could be properly resourced and accomplished. 16

j. Recommendations for Corrective Action:

(1) Page 21, Item 1. Non-concur. Such blanket rules force the leadership to subvert the mandates to develop new innovative acquisition processes to more effectively field weapon systems. This proposed rule would require every system to follow the heal-to-toe protracted schedule rather than the team approach to streamlined, concurrent engineering, with continuous improvement process where it can be shown as the most cost effective method. 19

(2) Page 22, Item 2, Non-concur. See Par. 2.j.(1) above. 21

(3) Page 22. Item 6. Non Issue. Representatives of CINCSOCOM directly participated in all Team SOA activities. The SOAE and Commander USASOC are members of the milestone review and quarterly Program Executive Steering Group Meetings, and the soldiers from the 160th SOAR planned and conducted the actual transportability tests. The results were certified by ATTLA and MTMC. 24

5

Final Report Reference

02 JUL 1993

SFAE-AV-SOA
SUBJECT: Draft Audit Report on the Transportability of Major Weapon and Support Systems (Project No. 2LC-5023)

32 k. Profile of Systems Reviewed: The report states that the MH-60K is required to be transported in the C-17. This has never been stated in the Required Operational Capability documents and has never been a part of the program. If the DOD-IG would provide the certified need and resources, a test could be accomplished within 30 days of receipt of those requisites as dictated in the DODO 5000.1 for program change proposals.

50 l. Summary of Potential Benefits Resulting from Audit: It is ironic that the program avoided close to $1M in added costs by using a retrofit kit rather than paying the high overhead rates of the aircraft manufacturer. However, undaunted by these savings the DOD-IG is recommending this be accomplished by the prime manufacturer in order to conform to the outmoded acquisition cycle.

3. Point of contact for this action is J.C. Rickmeyer, DSN 693-1554.

MICHAEL W. ROGERS
LTC AV
Product Manager,
Special Operations Aircraft

6

Final Report Reference

COMMAND REPLY

DOD IG Draft Audit Report, Transportability of Major Weapon Systems (Project No. 2LC-5023)

Finding. C-5 Aircraft Loading. The program manager for the MH-60K did not have the maximum loading capacity determined and certified by ATTLA, an AFMC activity, before production; and the prime contractor did not meet the contractually required disassembly time for C-5 transport. 15

Additional Facts. None.

Recommendation. We recommend that the Commander in Chief, United States Special Operations Command, develop, with the Air Transportability Test Loading Agency, the loading plans for the reconfigured MH-60K helicopter before performing the retrofits to the fuel system and antenna. 24

Action Taken. Nonconcur. Loading plans have always been a basic part of the program, since prior to the initial development contract. These plans are updated as design, test results, and customer directions dictate. Copies of this documentation were previously furnished to the report's authors. The PM-SOA will continue to coordinate with Air Transportability Test Loading Agency.

Potential Monetary Benefit. A basic part of any benefit must be the cost of implementation; in the case of the fuel system modification, $350K of necessary changes. The modifications accomplished at that price are preferable to the cost (time and money) of contracting with the aircraft prime manufacturer for the modifications (in excess of $1M in direct costs plus extending the acquisition cycle at a program cost of $2M to $3M per month for six months). The program avoided close to $1M in added costs by using a retrofit kit, rather than paying the high overhead rates of the aircraft manufacturer. 50

Final Report Reference

SAF/AQ RESPONSE
TO
DOD IG Draft Audit Report on the Transportability of Major Weapon and Support Systems
(Project No. 2LC-5023)

17 DoD IG Finding (Part II, p.19). The Air Force Pave Hawk program manager did not obtain C-141 transport aircraft certification from the Air Transportability Test Loading Agency (ATTLA). The Pave Hawk program manager has not provided ATTLA with the necessary funds and resources to perform the tests.

Additional facts. The Air Force was directed in the early 1980's to use the Army procured UH-60 helicopter as the most cost effective vehicle to satisfy special operations and combat rescue helicopter requirements. The basic UH-60 airframe is transportable on the C-141. Warner Robins Air Logistic Center conducted engineering studies on loading the modified MH-60G on the C-141. These results indicated the radar support structure would be crushed during loading. The user accepted this restriction since their tactical deployment method uses the C-5 which can carry more helicopters per aircraft.

25 DoD IG Recommendation Number 7. We recommend that the Pave Hawk helicopter program manager cancel plans to spend about $4.4 million to retrofit the helicopter unless the Air Transportability Test Loading Agency determines that the Pave Hawk cannot be loaded onto the C-141 aircraft without the retrofit, and the Air Mobility Command states that the C-141 aircraft will be available to transport Pave Hawk helicopters.

Response. Non concur. The requirement to move the weather radome on the MH-60G is directed at improving the field of view of the Forward Looking Infrared Radar (FLIR) for improved mission effectiveness. The FLIR has a blind zone in its left quadrant due to the present location of the radar support structure. We have no objection to test loading of the MH-60Gs on the C-141 for certification purposes; however we intend to continue with plans to modify the MH-60G. The Pave Hawk program manager has formed a process action team to perform the necessary engineering studies and has coordinated with ATTLA for a test load of an MH-60G. The required funding has been requested from HQ ACC.

My POC is Major Burrell, AQQU, 7-9767.

Department of the Army Office of the Deputy Chief of Staff for Logistics Comments

Final Report Reference

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR LOGISTICS
WASHINGTON, DC 20310-0500

25 AUG 1993

DALO-TSM

MEMORANDUM THRU TWR

DEPUTY CHIEF OF STAFF FOR LOGISTICS

~~DIRECTOR OF THE ARMY STAFF~~ MICHAEL L. RAMIREZ, LTC, GS, ADAB

ACTING ASSISTANT SECRETARY OF THE ARMY (INSTALLATIONS, LOGISTICS AND ENVIRONMENT)

FOR ~~ASSISTANT DEPUTY UNDER SECRETARY OF DEFENSE (LOGISTICS)~~ ~~TRANSPORTATION POLICY~~ IG, DOD (Auditing) Eric A. Orsini Deputy Assistant Secretary of the Army (Logistics) OASA (I&L)

SUBJECT: Draft Audit Report on the Transportability of Major Weapon and Support Systems (Project No. 2LC-5023)--INFORMATION MEMORANDUM

1. This is in response to your memorandum of 26 Jul 93 (Tab A), concerning the findings of subject audit to determine if the military departments were effectively considering transportability factors during the acquisition of major weapon and support systems.

2. At Tab B is the Army response to the Department of Defense Inspector General's findings and recommendations. The Army concurs with recommendations 2, 3, 4.a, 4.b, and 5, and partially concurs with 1.b. The Army nonconcurs with the following: 19 - 24

a. Recommendation 1.a: That U.S. Transportation Command be responsible for specific levels of certification of transportability requirements for major weapon and support systems. 19

b. Recommendation 6: The need to develop loading plans for the reconfigured MH-60K helicopter prior to retrofit to fuel system and antenna. 24

c. Allegations that transportability requirements were not adequately addressed and met during the acquisition process for the Armored Gun System.

3. No comment is furnished on Recommendation 7 in that it is an Air Force issue. 25

CF: Dispatcher's Initials:

DACA(L) #.0497/CRW0453

DALO-TSM
SUBJECT: Draft Audit Report on the Transportability of Major Weapon and Support Systems (Project No. 2LC-5023)--
INFORMATION MEMORANDUM

4. Maximum efficiency of the Army's Engineering for Transportability Program rests in the adequacy of the DoD directives and regulations that implement the program. Recommendations contained in the DoD IG audit will further enhance the program's long term objectives.

2 Encls

HUBERT G. SMITH
Major General, GS
Director of Transportation,
Energy and Troop Support

CF:
VCSA
DODIG

OASA (IL&E) - Concur, Mr Campo/75200 (by conference)
SARDA (SARD-SI) - Concur, COL Simonich/43993 (by conference)
SARDA (SARD-SA) - Concur, COL Gautreaux/47905 (by conference)
SARDA (SARD-SC) - Concur, COL Yerkes/70046 (by conference)
MTMCTEA (MTTE-TR) - Concur, Mr. Cassidy/804-878-2776 (by phone)

Ms. Coffey/X46606

2

Final Report Reference

ARMY RESPONSE TO DRAFT OF PROPOSED AUDIT REPORT PROJECT 2LC-5023

SUBJECT: Transportability of Major Weapon and Support Systems

RECOMMENDATION #1.a: 19

Revise DoD Directive 5158.4 to make the U. S. Transportation Command responsible for certifying that transportability requirements are met for major weapon and support systems before low rate initial production award, and production and major modification.

DA RESPONSE:

Nonconcur.

Procurement--equipping and modernizing the force, which encompasses transportability requirements, is a Service-related responsibility. A CINC's responsibility is to identify requirements. Compliance with existing policies and directives by Service Program Executive Officers and Program Managers, will ensure transportability issues are satisfied prior to low rate initial production, without adding another level of approval to the acquisition process.

RECOMMENDATION #1.b: 20

Promptly issue DoD Directive 4510.XX, "Defense Transportation Engineering," to clarify transportability roles, responsibilities, and approval process for obtaining transportability certifications during the acquisition of major weapon and support systems.

DA RESPONSE:

Partially concur in that DOD Directive 4510.XX should be issued; however, the purpose of the directive is to establish a disciplined approach for conduct of DoD transportation engineering, the appointment of an Executive Agency for related policy and issues, and establishment of a single DoD transportation engineering policy document. It is not intended to address the specifics for obtaining transportability certification during the acquisition process.

RECOMMENDATION #2: 21

We recommend that the Under Secretary of Defense for Acquisition revise DOD Instruction 5000.2 to require that program managers not proceed to low rate initial production award or major modification of weapon and support systems until transportability requirements are met.

Final Report Reference

DA RESPONSE:

Concur.

22 RECOMMENDATION #3:

We recommend that the Army Acquisition Executive reduce the Armored Gun System planned procurement by about $186 million for 58 systems if the Armored Gun System cannot be successfully low velocity airdropped from a C-130 aircraft; or if an alternative tactical aircraft that has demonstrated the capability to meet the Armored Gun System low velocity airdrop mission will not be available to support Armored Gun System airdrop missions.

DA RESPONSE:

Concur with recommendation that the Armored Gun System successfully meet low velocity airdrop testing prior to proceeding with procurement.

Nonconcur with content of the report in that the DOD IG's allegations that transportability requirements were not adequately addressed and met during the acquisition process are unfounded. Rebuttal from the Office of the Assistant Secretary of the Army for Research Development, and Acquisition (SARDA) addressing allegations in detail is at Attachment 1.

Attachment 1 on Page 70

22 RECOMMENDATION #4:

We recommend that the Joint Services Imagery Processing System program manager coordinate with the Air Force Shelter Management Office to:

22 a. Verify that modified shelters can safely transport the Joint Services Imagery Processing System and be effectively supported in the field:

23 b. Purchase the additional shelters needed.

DA RESPONSE:

Concur with recommendation 4.a; however, an air movement certification was requested and approved through DoD channels.

Concur with recommendation 4.b to proceed with the purchase of the shelters; however, it should be noted that purchasing a sufficient quantity of MilStd shelters to house the JSIPS would result in twice as many shelters in addition to an increase in the number of vehicles for shelter movement. A purchase of the contractor-modified trailers (even though more costly by unit) will result in an overall estimated one million dollar savings. The most effective way of meeting system cost and schedule is by contractor-provided shelters.

Final Report Reference

SARDA response dated 30 Jul 93 is at Attachment 2.

24

RECOMMENDATION #5:

We recommend that the Army Space Program office, in conjunction with the Army Tank Automotive Command, verify that Joint Imagery Processing System trailers can safely transport the modified and overloaded shelters and that the trailers can be effectively supported in the field.

DA RESPONSE:

Concur. Target date for initial coordination with the Army Tank Automotive Command (TACOM) is projected for 30 Aug 93. SARDA response dated 30 Jul 93 is at Attachment 2.

Attachment 2 on Page 73

RECOMMENDATION #6:

24

We recommend that the Commander, United States Special Operations Command, develop, with the Air Transportability Test Loading Agency, the loading plans for the reconfigured MH-60K helicopter before performing the retrofits to the fuel system and antenna.

DA RESPONSE:

Nonconcur.

Loading plans for the reconfigured MH-60K helicopter have always been an integral part of the program, since prior to initial development. USSOCOM rebuttal is set forth in Attachment 3.

Attachment 3 on Page 98

RECOMMENDATION #7:

25

We recommend that the Pave Hawk helicopter program manager cancel plans to spend about $4.4 million to retrofit the helicopter unless the Air Transportability Test Loading Agency determines that the Pave Hawk cannot be loaded onto the C-141 aircraft without the retrofit, and the Air Mobility Command states that the C-141 aircraft will be available to transport Pave Hawk helicopters.

DA RESPONSE:

No comment is provided in that the Pave Hawk program is an Air Force related issue. USSOCOM response is at Attachment 3.

Attachment 3 on Page 98

3 Attachments

3

Department of the Air Force Deputy Chief of Staff (Logistics) Comments

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.

23 SEP 1993

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

SUBJECT: DoD (IG) Draft Report on the Transportability of Major Weapon and Support Systems, 2 Jun 93, (Project No. 2LC-5023)-INFORMATION MEMORANDUM

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

Management comments are included in attachment one for your information. We concur with your recommendations to improve transportability of equipment. Additional comments are also provided to clarify the body of the report.

JOHN M. NOWAK, Lt Gen, USAF
DCS/Logistics

Attachment
Management Comments

Final Report Reference

PROPOSED AUDIT REPORT (PROJECT NO. 2LC-5023)
TRANSPORTABILITY OF MAJOR WEAPON AND SUPPORT SYSTEMS, 2 Jun 93

RECOMMENDATION 1. We recommend that the Deputy Secretary of Defense: 19

a. Revise DoD Directive 5158.4 to make the U.S. Transportation Command responsible for certifying that transportability requirements are met for major weapon and support systems before low rate initial production award, and production and major modification.

MANAGEMENT COMMENTS: Concur. Although USTRANSCOM is the single manager for air, land and sea transportation for the DOD, responsibility for certifying air transportability in fixed wing aircraft is the responsibility of the Air Force Materiel Command, which is not under the USTRANSCOM. Designation of USTRANSCOM for certifying air transportability will help assure alternative modes are properly considered. USTRANSCOM transportability certification should occur after Low Rate Initial Production and prior to Milestone III.

b. Promptly issue DoD Directive 4510.XX, "Defense Transportation Engineering" to clarify transportability roles, responsibilities, and approval process for obtaining transportability certifications during the acquisition of major weapon and support systems. 20

MANAGEMENT COMMENTS: Concur. Promulgation of a new DoD directive will provide added emphasis to assure transportability is considered in the acquisition process with improved readiness of US armed forces. Although DoDD 3224.1 (Engineering for Transportability) was rescinded, the Services retained AR 70-4/ OPNAVINST 4600.22B/AFR 80-18/MCO 4610.14C/DLAR 4500.25 (DOD Engineering for Transportability), for safety of flight. DODD 4510.XX will replace the former authority for this joint service directive.

RECOMMENDATION 2. We recommend that the Under Secretary of Defense for Acquisition revise DoD Instruction 5000.2 to require program managers not to proceed to low rate initial production award or major modification of weapon and support systems until transportability requirements are met. 21

Final Report Reference

MANAGEMENT COMMENTS: Concur with intent. However, low rate initial production (LRIP) provides limited production assets to conduct initial operational test and evaluation (IOT&E) as well as establish a production base. LRIP assets are required to support rigorous testing to demonstrate that system requirements, including transportability, are met. DoDI 5000.2, by design, has geared LRIP towards assessing a system's capability prior to production and deployment. It is imperative that these requirements be met prior to production. Transportability cannot be fully assessed unless test assets are available against which requirements can be fully tested.

22 RECOMMENDATION 3. We recommend that the Army Acquisition Executive reduce the Armored Gun System (AGS) planned procurement by about $ 186 million for 58 systems if the Armored Gun System cannot be successfully low velocity airdropped from a C-130 aircraft; or if an alternative tactical aircraft that has demonstrated the capability to meet the Armored Gun System low velocity airdrop mission will not be available to support Armored Gun System airdrop missions.

MANAGEMENT COMMENTS: Concur. The AGS itself is capable of being airdropped by tactical aircraft. However, it cannot be airdropped at the weight, with enough fuel and ammunition to engage in immediate combat operations.

RECOMMENDATION 4: We recommend that the Joint Services Imagery Processing System (JSIPS) program manager coordinate with the Air Force Shelter Management Office to:

22 a. Verify that modified shelters can safely transport the Joint Services Imagery Processing System and be effectively supported in the field.

MANAGEMENT COMMENTS: Concur.

23 b. Purchase the additional shelters needed.

MANAGEMENT COMMENTS: Non-concur. JSIPS is a highly complex and expensive system ($25+M) assembled from both commercial and developed equipment. Proper shelter construction, shock transmissibility, equipment racks/packaging etc. are essential to satisfy system transport requirements. These design factors were successfully addressed during the Engineering, Manufacturing and Development phase via the use of tailored ISO shelters, unique shock skids etc. Use of a standard family shelter for production would introduce an unacceptably high technical risk-one which the prime contractor would probably not accept or would price astronomically high. Shelter Management Office procurement of an "identical" JSIPS shelter would result in some small savings but the schedule/performance risk associated with providing the shelter as Government Furnished Equipment would more than offset any potential gains. Data on the JSIPS shelters has been provided to the SMO who will add JSIPS to the DoD standard family of shelters. The SMO will review JSIPS shelter design data, test results and deployment history to confirm the ability to safely transport the shelters.

Final Report Reference

RECOMMENDATION 5: We recommend that the Army Space Program Office, in conjunction with the Army Tank Automotive Command, verify that Joint Imagery Processing System trailers can safely transport the modified and overloaded shelters and that the trailers can be effectively supported in the field. 24

MANAGEMENT COMMENTS: Concur.

RECOMMENDATION 6: We recommend that the Commander,United States Special Operations Command develop, with the Air Transportability Test Loading Agency, the loading plans for the reconfigured MH-60K helicopter before performing the retrofits to the fuel system and antenna. 24

MANAGEMENT COMMENTS: Concur.

RECOMMENDATION 7. We recommend that the Pave Hawk helicopter program manager cancel plans to spend about $ 4.4 million to retrofit the helicopter unless the Air Transportability Test Loading Agency determines that the Pave Hawk cannot be loaded onto the C-141 aircraft without the retrofit, and the Air Mobility Command states that the C-141 aircraft will be available to transport the Pave Hawk helicopters. 25

MANAGEMENT COMMENTS: Concur. However, believe that the test cited in the recommendation should be stated that the Pave Hawk program should proceed if it can be loaded with the retrofit.

Final Report Reference

Proposed Comments to DoD IG Draft Report
Transportability of Major Weapon and Support Systems
Project # 2LC-5023

7 1. Transportability Roles and Responsibilities, page 7, paragraph 2 add the following after the last sentence, "Instead, Joint Service Regulation, AR 70-44/OPNAVINST 4600.22B/AFR 80-18/MCO 4610.14C/DLAR 4500.25, DoD Engineering for Transportability, 1 Sep 78, paragraph 6.b.(9), assigns this responsibility to the Service Transportability Agents." **Rationale:** Although there is not a single responsible DoD organization, sentence clarifies the fact that each service has assigned this responsibility to their respective Service Transportability Agents.

8 2. Transportability Roles and Responsibilities, page 8, paragraph 4, line 14 starting with "The Services were drafting" through end of paragraph require change to reflect that the Services are updating Joint Service Regulation, AR 70-44/OPNAVINST 4600.22B/AFR 80-18/MCO 4610.14C/DLAR 4500.25, DoD Engineering for Transportability, as opposed to drafting a new joint regulation. **Rationale:** Recognize that this joint regulation existed prior to this DoD IG audit. This joint regulation was first issued 1 Sep 78.

9 3. Armored Gun System, page 9, second sentence change to read "The AGS is technically capable of being airdropped within the limits of available tactical aircraft. However, it cannot be airdropped at the weight, based on fuel and ammunition loads, required to engage in immediate and effective combat operations." **Rationale:** As stated.

10 4. AGS Weight, page 10, line 9 change "35,500" to "42,000." **Rationale:** The loading manual for the C-130 aircraft (TO 1C-130A-9) was supplemented by TO 1C-130-9S-141, dated 4 Jan 90, to permit a maximum rigged airdrop load of 42,000 pounds.

10 5. C-17 Aircraft Availability, page 10, line 6 change "102" to "120." The appropriate number is 120 on the basis that the original number, 210, included all planes for delivery, i.e., aircraft for training and back-up. **Rationale:** This change will eliminate confusion and compare similar items.

15 6. C-5 Aircraft Loading, page 17, paragraph 1, line 8 change sentence beginning with "ATTLA conducts maximum" to read "If ATTLA deems a maximum density test loading necessary prior to aircraft certification that recommendation is forwarded to AMC/TEA. ATTLA then provides to the USAF Mobility Center Test Director on-site engineering support for such tests to determine the most efficient use of aircraft space." **Rationale:** Test loadings are technically under the control of AMC/TEA (formerly AMC/XTRA). This change will accurately portray ATTLA's roles and responsibilities.

Final Report Reference

7. C-141 Aircraft Loading, page 19, paragraph 1, 3rd sentence change to read "Although ATTLA certified the Pave Hawk helicopter for C-5 aircraft transport, the radome and refueling probe imposed tight aircraft ramp and floor clearance. ATTLA has recommended a test loading to determine the required amount of approach shoring to prevent contacts with the ramp during loading." **Rationale:** Both the radome and refueling probe, not just the radome, impose tight aircraft ramp and floor clearances. In fact, the radome was found to be less of a problem than the projection of the refueling probe based on desktop analysis. 17

8. Appendix C, Transportability Activities and Their Responsibilities, Army, page 30 change the first sentence of Natick Research Development, and Engineering Center responsibilities to read "Provides transportation certification for materiel to rotary aircraft, and safe recovery certification for rigged configurations to be airdropped by fixed wing aircraft." **Rationale:** Natick Research, Development, and Engineering Center is not solely responsible for "certification for materiel to be airdropped by fixed wing aircraft." ATTLA performs certification of the rigged configuration loads to ensure the each configuration can be safely flown and extracted from the aircraft. 38

9. Appendix C, Transportability Activities and Their Responsibilities, Air Force, page 30, Activities column change "Air Force Materiel Command Logistics Transportation Division" to "Aeronautical Systems Center, Air Transportability Test Loading Agency." **Rationale:** ATTLA, not AFMC/LGT, provides air transportability approvals for all airlifted items using the military airlift systems regardless of the user of the airlift services. 38

10. Appendix D, DoD Airlift Resources, Quantity column change "102" to "120." **Rationale:** Same as comment 5. 40

11. Appendix D, DoD Airlift Resources, Footnote 2, change "September 1994" to "January 1995." **Rationale:** This is the current planned date for the first operational C-17 aircraft squadron. 40

Final Report Reference

JSIPS COMMENTS ON DRAFT DOD IG AUDIT REPORT TRANSPORTABILITY OF MAJOR WEAPON AND SUPPORT SYSTEMS

11 1. FINDING: Modification of Shelters

JSIPS did not coordinate with the Air Force Shelter Management Office and did not use a shelter from the DoD standard family of tactical shelters.

SPO POSITION: Partially Concur

Comments: A trade study which was shown to the auditors, was conducted to determine if DoD standard shelters would meet JSIPS requirements. The study concluded that existing inventory shelters could not. Further, attempts to modify existing shelters to satisfy JSIPS requirements would not be feasible or cost effective.

Status: Now that JSIPS shelters have been developed and tested, the program office is working with the Shelter Management Office to add the JSIPS shelters to the DoD standard family.

12 2. FINDING: Cost of Shelters

A savings of $2.0M could have been achieved during the Engineering Manufacturing and Development phase if standard shelters were procured from the Army Aviation Troop Support Command. An additional $1.6M expenditure could potentially be avoided if production shelters are obtained through the military item manager.

SPO POSITION: Non-Concur

Comments: First, no insight has been provided on the methodology of calculating purposed savings. The source of the $2.9M estimate for prime contractor procurement of eight shelters is also unclear. We informed the auditor that the shelter average unit cost was 160K or only 1.3M for the initial eight units. This per unit cost equates to approximately $4.5M (vs $4.2M cited by the auditor) in production.

Second, the JSIPS shelter cost includes monies to satisfy TEMPEST requirements, Chemical, Biological and Radiological equipment interface, internal shelter ducting and lighting, Army ECU support frames, power/signal cable entry panel cut-outs, shock skid interface, hard point/ equipment mounting inserts, lift slings etc. It is highly unlikely that the inventory item shelter cost included such features and the costs to tailor these shelters to meet JSIPS requirements would reduce or eliminate projected cost savings.

Lack of a standard family shelter which met JSIPS requirements , was also a driving factor in shelter cost. As noted by the auditor, existing standard family shelters had rated gross weight capacities of 6,170 lbs (10 ft) and 11,180 lbs (20ft) compared to the 9,008 lbs and 17,748 lbs payloads associated with JSIPS shelters. This factor could easily double the number of shelters required for JSIPS negating any potential

Final Report Reference

cost savings based on shelter procurement. Further, the costs associated with ancillary support equipment (trucks, trailers, dolly sets, environmental control units, pallets etc.) would dramatically increase as would airlift and personnel costs. These life cycle cost increases would clearly out-weigh any potential near term acquisition cost savings.

3. FINDING: Overloading of Shelters 12

The JSIPS shelters were overloaded without adequate coordination with the Air Force Shelter Management Office. This placed the successful transportation of JSIPS at risk.

SPO POSITION: Non-Concur

Comments: The JSIPS system specification clearly required the prime contractor to provide a system that compiled with all user requirements including transportation by land, sea and air. This included shelters with rated gross weight payloads consistent with the JSIPS equipment provided. Consequently, while the JSIPS payload exceeded that of the standard family shelters, the JSIPS shelters were not "overloaded" as the shelters were specially designed to handle the JSIPS payload and weight distribution. As noted previously, the adequacy of the JSIPS system design has been fully verified by over 3,500 miles of mobility testing and other over the road transport. Air Transport Certification has also been received for air lift of the Army system shelters to Germany. The Brunswick shelters have also been certified for shipboard transportation. The program office is currently working with Natick Labs to obtain helicopter lift certification. These certifications further confirm that the system shelters are not overloaded. Further, while Shelter Management Office (SMO) personnel were not directly involved in JSIPS shelter design, personnel from MITRE's Mechanical Systems Engineering Specialty Group, which routinely provides technical support to the SMO, were involved in this process.

4. FINDING: Trailer (Modification)

The Army significantly modified five military standard semi-trailers without coordinating the changes with the Army Tank and Automotive Command. 12

SPO POSITION: Non-Concur based on the subsequent comments provided by ASPO.

Comments: The M871A1 trailer required a modification because of an Army Tank and Automotive Command (TACOM) modification of the M939 series of 5 ton tactical tractors. A nine inch increase of fifth wheel height on the tractor caused the JSIPS tractor/trailer/shelter combination to exceed the European bridge height requirement. When confronted with this problem, TACOM representatives stated that they had no Army requirements to transport 20 foot ISO shelters in Europe. TACOM representatives did indicate that they could develop a specific trailer for the Army JSIPS, but it would be a unique commercial item and it would not meet the JSIPS contract required Government Furnished Equipment (GFE) delivery schedule. M871A1 trailers were designed to transport 22 1/2 tons of cargo, the modified M871A1 is required to transport half

Final Report Reference

of that amount. M871A1 trailer are supportable throughout the Army, unique commercial trailers are not.

The draft audit report implies that a TACOM solution could have been implemented during the two years that elapsed between the discovery of the height problem and the date of the modification contract award. This is not the case. During the two year period:

(a) Army user requirements were revalidated
(b) Substitution of alternative equipment was recommended and rejected by the Army users
(c) TACOM's commercial trailer proposal was considered and rejected
(d) a limited transportability test plan and the request for Proposal (RFP) for the modification contract was prepared
(e) the competitive contract was announced
(f) the contract was awarded at the conclusion of the source selection process

Every effort was made to ensure that the modified trailers were safe and transportable. The modification contractor was required to conduct a limited improved road, unimproved road and cross country test while loaded with 20,000 lbs on the trailer bed and 3,000 lbs on the gooseneck platform. No design or workmanship flaws were identified as a result of this test.

An air movement certification was requested and approved through DoD channels. As noted previously, the Army JSIPS was deployed to Germany on U.S. Air Force C-5 and C-1412 aircraft, demonstrating that it met those system requirements.

22 - 23

5. RECOMMENDATION: Air Force Shelter Management Office (SMO)

JSIPS should coordinate with the SMO to:

a) Verify that modified shelters can safely transport JSIPS and be effectively supported in the field
b) Purchase the additional shelters needed

SPO POSITION: Partially Concur

Comments: Concur with the recommendation to further verify transportation safety but non-concur with SMO procurement of additional shelters.

JSIPS is a highly complex and expensive system ($25+M) assembled from both commercial and developed equipment. Proper shelter construction, shock transmissibility, equipment racks/packaging etc. are essential to satisfy system transport requirements. These design factors were successfully addressed during the Engineering, Manufacturing and Development phase via the use of tailored ISO shelters, unique shock skids etc. Use of a standard family shelter for production would introduce an unacceptably high technical risk--one which the prime contractor would most likely not accept (or would price astronomically

Final Report Reference

high). SMO procurement of an "identical" JSIPS shelter would result in some small savings but the schedule/performance risk associated with providing the shelter as Government Furnished Equipment would more than off set any potential gains.

Status: Contact has been established with the shelter management office. Data on the JSIPS shelters has been provided and the SMO is working toward adding JSIPS to the DoD Standard family of shelters. The SMO has also agreed to review JSIPS shelter design data, test results and deployment history to further confirm the ability to safely transport the system.

6. RECOMMENDATION: The ASPO work with the Army Tank Automotive Command to verify that JSIPS shelters can be safely transported on modified trailers 24

SPO POSITION: Concur

Status: ASPO will work with TACOM to get an approved modification for the trailers that have already been modified. Initial coordination with TACOM should be complete by 30 Aug 1993.

ASPO is working with TACOM to develop and build trailers for future Army JSIPS. TACOM is reviewing the description of the required trailers. This was provided to them in late May of this year. The funding and fielding schedule of future Army JSIPS will determine the completion date of this action.

Deputy Commander in Chief of the United States Special Operations Command Comments

UNITED STATES SPECIAL OPERATIONS COMMAND
OFFICE OF THE DEPUTY COMMANDER IN CHIEF AND CHIEF OF STAFF
MACDILL AIR FORCE BASE, FLORIDA 33608-6001

29 JUL 93

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

SUBJECT: Draft Audit Report - Transportability of Major Weapon and Support Systems (Project Number 2LC-5023)

1. Attached is the United States Special Operations Command (USSOCOM) reply to the subject Department of Defense Inspector General draft audit report. As previously agreed, we are submitting responses only to those findings pertinent to special operations programs.

2. It is sincerely hoped that the information contained in our reply adequately addresses the concerns expressed by the Office of the Inspector General. USSOCOM appreciates the opportunity to officially address this report and is prepared to provide further information if needed.

Irve C. LeMoyne

IRVE C. LE MOYNE
Rear Admiral, U.S. Navy
Deputy Commander in Chief
and Chief of Staff

Encl
as

Final Report Reference

COMMAND REPLY

DOD IG Draft Audit Report, Transportability of Major Weapon Systems (Project No. 2LC-5023)

Finding. The Air Force Pave Hawk program manager modified the Blackhawk helicopter without ensuring that the helicopter could meet C-141 aircraft loading requirements. 16

Additional Facts. The historical paper trail on the radar installation is incomplete. Most improvements were Class IV and Class V modifications based on Statements of Operational Need initiated prior to a published Systems Operational Requirements Document (SORD). MAC SORD 313-79 for MH-60G Pave Hawk Special Operations Forces Configuration, 19 June 1990, lists the requirement for the radar and transport on the C-5, C-141 and C-17. However, that SORD was published two years after the weather radar was prototyped on the Air Force MH-60s and one year after the production line began. Transport on C-141 may be required due to a limited number of C-5 aircraft, but tear-down and build-up times (up to 14 hours) involved in C-141 preparation would preclude rapid tactical load-out.

Recommendation. That the Pave Hawk helicopter program manager cancel plans to spend about $4.4 million to retrofit the helicopter unless the Air Transportability Test Loading Agency determines that the Pave Hawk cannot be loaded onto the C-141 aircraft without the retrofit, and the Air Mobility Command states that the C-141 aircraft will be available to transport Pave Hawk helicopters.

Action Taken. Concur. To date only a preliminary look has been done regarding the radome and C-141 transport. Transport on the C-17 has never been evaluated. Before fixing the "problem" we need to ensure the current configuration will not fit on the C-141, but precautions must be taken not to crush the radome in an attempt to load an MH/HH-60G on a C-141. The AF Form 1067, mentioned in the Pave Hawk transportability narrative, covers two separate problems. First, relocation of the radome should allow non-tactical transport in the C-141. Secondly, relocation of the radome should alleviate a blind spot in the Forward Looking Infrared (FLIR) image when looking left.

Potential Monetary Benefit. Canceling the radome relocation in all 97 MH/HH-60Gs would save approximately $43K per aircraft (based on rough order of magnitude (ROM) cost data obtained from WR-ALC/LUHE). However, all 97 aircraft may not require modification based on mobility requirements of ACC, AFRES and ANG units.

Deputy Commander in Chief of the United States Special Operations Command Comments

Final Report Reference

COMMAND REPLY

DOD IG Draft Audit Report, Transportability of Major Weapon Systems (Project No. 2LC-5023)

15

Finding. C-5 Aircraft Loading. The program manager for the MH-60K did not have the maximum loading capacity determined and certified by ATTLA, an AFMC activity, before production; and the prime contractor did not meet the contractually required disassembly time for C-5 transport.

Additional Facts. None.

Recommendation. We recommend that the Commander in Chief, United States Special Operations Command, develop, with the Air Transportability Test Loading Agency, the loading plans for the reconfigured MH-60K helicopter before performing the retrofits to the fuel system and antenna.

Action Taken. Nonconcur. Loading plans have always been a basic part of the program, since prior to the initial development contract. These plans are updated as design, test results, and customer directions dictate. Copies of this documentation were previously furnished to the report's authors. The PM-SOA will continue to coordinate with Air Transportability Test Loading Agency.

Potential Monetary Benefit. A basic part of any benefit must be the cost of implementation; in the case of the fuel system modification, $350K of necessary changes. The modifications accomplished at that price are preferable to the cost (time and money) of contracting with the aircraft prime manufacturer for the modifications (in excess of $1M in direct costs plus extending the acquisition cycle at a program cost of $2M to $3M per month for six months). The program avoided close to $1M in added costs by using a retrofit kit, rather than paying the high overhead rates of the aircraft manufacturer.

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