

Audit



Report

OFFICE OF THE INSPECTOR GENERAL

**WEAPON SYSTEM SUPPORTABILITY FOR WHEELED,
TRACKED, AND AMPHIBIOUS VEHICLES IN THE
MARINE CORPS**

Report No. 97-180

June 30, 1997

Department of Defense

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Acronyms

AAV	Assault Amphibious Vehicle
IROAN	Inspect, Repair Only as Necessary
LAV-AD	Light Armored Vehicle-Air Defense
MILCON	Military Construction
RAM	Reliability, Availability, Maintainability



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June 30, 1997

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

SUBJECT: Audit Report on Weapon System Supportability for Wheeled, Tracked, and Amphibious Vehicles in the Marine Corps (Report No. 97-180)

We are providing this report for review and comment. Management comments on a draft report were considered in preparing the final report.

DoD Directive 7650.3 requires that all recommendations be resolved promptly. We request that the Marine Corps provide additional comments on the recommendation by August 29, 1997.

We appreciate the courtesies extended to the audit staff. Questions on the audit should be directed to Mr. James L. Koloshey, Audit Program Director, at (703) 604-8961 (DSN 664-8961) or Mr. Michael E. Simpson, Audit Project Manager, at (703) 604-8972 (DSN 664-8972). See Appendix C for the report distribution. The audit team members are listed inside the back cover.

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Office of the Inspector General, DoD

Report No. 97-180
(Project No. 6AG-0029.00)

June 30, 1997

Weapon System Supportability for Wheeled, Tracked, and Amphibious Vehicles in the Marine Corps

Executive Summary

Introduction. Supportability planning is an essential element in the acquisition of new weapon systems and the transfer of existing weapon systems. Certain aspects of supportability planning, such as appropriate facilities, must be acquired concurrently with the system to reduce risks and to ensure that the fielded system can be supported.

Audit Objectives. The overall audit objective was to determine whether supportability planning was adequate for fielding systems to the Marine Corps and Marine Corps Reserve. Specifically, we reviewed tracked, wheeled, and amphibious weapon systems that the Marine Corps active and Reserve components acquired or would acquire through procurement or transfer. We also reviewed management controls as they applied to the overall audit objective.

Audit Results. Overall supportability planning for the Marine Corps tracked, wheeled, and amphibious weapon systems programs was effective for the 12 systems we selected for review. However, the Marine Corps did not fully plan for the necessary facilities to support the Assault Amphibious Vehicle and the Light Armored Vehicle Air Defense program. Supportability, safety, and readiness could be adversely affected at the units receiving those systems. See Part I for a discussion of the audit results. Issues relative to the ability of the Assault Amphibious Vehicle and M88A2 Hercules to continue effective operation are discussed in Appendix B. Marine Corps management controls were adequate in that we identified no material weaknesses over supportability planning for the weapon systems that we reviewed.

Summary of Recommendation. We recommend timely addressing of facilities support planning during the decisionmaking process for reorganizations.

Management Comments. The Marine Corps generally concurred with the report findings; however, it did not agree that facility deficiencies were because of inadequate planning but stated that they were from unforeseen budget constraints and troop realignments. The Marine Corps agreed to improve facilities support planning procedures, where warranted. See Part I for a discussion of management comments and Part III for a complete text of management comments.

Audit Response. We agree that budget constraints and troop alignments affected planning; however, we disagree that the Marine Corps sufficiently planned for facilities. We request that the Marine Corps reconsider its position on the recommendation and address how it will improve facilities planning procedures for reorganizations. We deleted the section in Appendix B on the Greater Sandy Run Area

Training Range, based on Marine Corps comments and additional data that the Marine Corps provided. We request that the Marine Corps respond by August 29, 1997.

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Part I - Audit Results

Audit Background

Supportability planning is an important process that helps accomplish management and analysis actions to ensure effective economical support of weapon systems, both before and after fielding. Systems, whether new or being transferred, need to have the necessary support items in place, such as facilities, staffing, parts, maintenance, and ancillary equipment, to be fully operational. Furthermore, logistics support considerations must be integrated concurrently with the system design.

Audit Objectives

The overall audit objective was to determine whether supportability planning was adequate for fielding systems to the Marine Corps and Marine Corps Reserve. We focused on tracked, wheeled, and amphibious weapon systems that the Marine Corps active and Reserve components acquired or would acquire through procurement or transfer from Active to Reserve forces. We also reviewed management controls as they applied to the overall audit objective. See Appendix A for a discussion of the audit scope and methodology, a summary of prior coverage of the audit objectives, and the details of our review of the management control program.

Other Supportability Issues

Generally, supportability planning for tracked, wheeled, and amphibious systems was effective. For the 12 systems that we selected for review, we assessed supportability planning to ensure that the Marine Corps provided the systems to the user with the necessary support infrastructure. We focused our review on the following areas: facilities, maintenance, support equipment, supply support, and training. We found no supportability issues for 10 of the 12 systems. However, the Marine Corps did not plan effectively for facilities required to support the reorganization of the Assault Amphibious Battalion and the acquisition of the Light Armored Vehicle - Air Defense (LAV-AD). The issue is discussed on the following pages. Based on additional data that the Marine Corps provided, we have deleted the section in Appendix B regarding supportability issues for the Greater Sandy Run Area Training Range.

Two areas related to supportability planning that the Marine Corps was attempting to address within constrained funding limits are summarized below and discussed in detail in Appendix B.

- o The ability to keep the AAVs efficiently operating over an extended life cycle is becoming difficult. The Marine Corps is studying options for the AAV operations until it fields the Advanced AAV.

- o Because of its low funding priority, Marine Corps procurement of the M88A2 Hercules improved recovery vehicle is delayed. The delay will result in a costly rebuild program to keep the existing M88A1 vehicle operational.

Facilities Support Planning

The Marine Corps did not adequately plan for or fund the facilities required to support the fielding of two weapon systems. The Marine Corps did not allow sufficient time to implement the facilities' support requirements before the 3rd Assault Amphibious Battalions' reorganization; moreover, acquisition officials did not verify that facilities support would be in place before LAV-AD production approval. As a result, the Marine Corps could deploy both systems without the necessary logistics infrastructure, which will adversely affect the supportability, safety, and operational readiness of the vehicles.

Guidance

Marine Corps Facilities Planning and Programming System. According to Marine Corps Order P11000.12, "Real Property Facilities Manual," the Marine Corps Facilities Planning and Programming System is the system prescribed to plan, program, budget, and execute all functions to acquire facilities for the Marine Corps. The Deputy Chief of Staff, Marine Corps (Installations and Logistics), is responsible for facilities policy within the Marine Corps. His duties include ensuring that facilities are adequately addressed and developing the facilities support requirements document. The facilities support requirements document is the basis on which a Marine Corps organization will conduct its facility planning and programming. The information in the facilities support requirements document is a projection designed to provide validity to the required facilities of an organization's 5-year military construction (MILCON) program. Other directives used for weapon system procurement include MCO 3500, "Combat Development Process;" MCO P500.10, "Systems Acquisition Management Manual;" and MCO P4105.3, "Integrated Logistics Support Manual."

Marine Corps MILCON Programming. Facilities support requirements are placed into a fiscally constrained priority list of MILCON projects. Generally, the Marine Corps submits MILCON projects approximately 4 years before initial funding is required for the program. Therefore, the Marine Corps must identify facilities during the planning phase to ensure that systems are supportable when they are fielded.

Planning for New AAV Units

Planning for and funding of the necessary facilities to support the reorganization for AAVs were inadequate. The decision to reorganize 78 AAVs from the Maritime Prepositioning Force to the 3rd Assault Amphibious Battalion did not

allow sufficient time to plan for the necessary facilities or the MILCON funding needed to complete the maintenance facilities.

AAV. The Marine Corps will use the AAV family of vehicles to land the surface assault elements of the landing force from assault shipping to inland objectives. Once ashore, the Marine Corps will employ the AAV as an armored personnel carrier. The AAV can travel up to 45 miles per hour on land and 8 miles per hour in water and can hold 3 crew members and 18 troops. It has two M257 smoke-grenade launchers and an upgunned weapons station with either a .50-caliber machine gun or a 40-millimeter grenade launcher machine gun.

Assault Amphibious Battalion Reorganization. The Commandant of the Marine Corps issued a Marine Corps bulletin entitled, "Assault Amphibious Battalion, FY 1994 Reorganization Actions," April 15, 1994. The message established an additional line company and mobility-counter mobility platoon at Camp Pendleton, California. The increases, which the Marine Corps made as a result of lessons learned in Operation Desert Storm, were validated by a Marine Corps long-range planning group in 1993. As a result, the 3rd Assault Amphibious Battalion at Camp Pendleton was scheduled to receive 78 AAVs from the Maritime Prepositioning Force during FYs 1996 through 1997.

AAV Facilities Requirements. The long-range planning group did not recommend the Deputy Chief of Staff, Marine Corps (Installations and Logistics), to assess the potential increase in facilities support requirements before the reorganization. However, the Commandant's bulletin directed the affected units to identify facilities requirements. The additional requirements include eight new maintenance bays, two maintenance support modules, and spare parts storage containers, at an estimated cost of \$5.4 million. Although facilities planning started as soon as the Marine Corps issued its AAV reorganization bulletin, the Marine Corps did not plan or consider facilities during the reorganization decisionmaking process, as required by existing regulations.

MILCON Funding Process Time Constraints. In September 1994, Camp Pendleton submitted an FY 1998 through 1999 MILCON project for maintenance facilities to support the additional AAVs. However, the project did not receive FY 1998 through 1999 MILCON budget approval from Headquarters, Marine Corps. Based on comments on a draft of this report, the Marine Corps has included funding for the project in the planned FY 2000 budget, which has not been approved. The fielding of AAVs to the Enhanced Equipment Allowance Pool at Twenty-Nine Palms before fielding at Camp Pendleton postponed the delivery date to January 1997. Camp Pendleton will field the AAVs before the base receives the funding to complete the required maintenance facilities. The Marine Corps did not fully consider the time required, after the decision, to implement MILCON programming and the cost to build the necessary facilities for the additional AAVs at Camp Pendleton during the decisionmaking process.

Impact From Inadequate Facility Support. The 3rd Assault Amphibious Battalion at Camp Pendleton has an increased risk of being unable to fully

perform its expanded mission before approval of the MILCON project, "Amphibious Vehicle Maintenance Facility." The Marine Corps will delay essential maintenance on 78 additional AAVs because of insufficient facilities and overcrowding. In addition, the Marine Corps Base Camp Pendleton DD Form 1391, "FY 1998 Military Construction Project Data," states that the improperly maintained AAVs will pose unnecessary safety hazards to Marine Corps personnel, and that the battalion's operational readiness will suffer.

The 3rd Assault Amphibious Battalion's parking space is inadequate to safely handle the 78 incoming vehicles. Camp Pendleton has approved a minor construction project to provide adequate and secure parking for the recently expanded AAV battalion. However, the AAV ramp extension project will accommodate only 48 of the 78 AAVs and does not address additional maintenance or storage deficiencies. The Marine Corps is taking necessary actions to address the maintenance and storage issues; however, the Marine Corps should reemphasize facilities planning during the decisionmaking process for a reorganization.

Lessons Learned: LAV-AD Acquisition

The Marine Corps did not fully address or plan for facilities for the LAV-AD companies before the Milestone III production decision. The Commander, Marine Corps Systems Command, granted Milestone III production approval in December 1995 to procure 17 systems for \$74 million.

LAV. The LAV-AD is the new variant providing a pedestal-mounted Stinger missile on the Marine Corps LAV. An LAV-AD platoon of 16 vehicles is scheduled to begin fielding at Marine Corps Air-Ground Combat Center, Twenty-Nine Palms, California, in September 1998.

LAV Facilities Support Requirements. The LAV-AD received production approval without fully identifying facilities support requirements. Two LAV-AD program documents, the Integrated Program Summary and the Integrated Logistics Support Plan, were contradictory in their identification of facilities support requirements.

The Integrated Program Summary, which was the governing document presented for the Milestone III Decision Review, stated that the LAV-AD program required no MILCON funding nor additional facilities. In contrast, the Integrated Logistics Support Plan, July 1995, identifies additional LAV-AD facilities requirements as shown in the Twenty-Nine Palms Marine Corps Base facilities support requirements document. The LAV-AD Integrated Logistics Support Plan states that support of the fielding of the LAV-AD would require \$869,250 in MILCON funding. The requirements include 10,000 square feet of sun shelters, 3,400 square feet of maintenance and support area, and additional built-in support items. Sun shelters are necessary to protect the vehicles and maintenance personnel from the harsh desert climate.

In October 1995, Twenty-Nine Palms personnel informed the LAV-AD Program Manager that MILCON was not required to support the new LAV-AD platoon; however, adequate facilities support for the new platoon would require the relocation of two resident units. Further, Twenty-Nine Palms personnel stated that those units would not be relocated until a milestone schedule was in place for implementation of the LAV-AD platoon. In December 1995, the Milestone III established an initial Operational Capability of April 1998. As of August 1996, no plans were in place to relocate the units. As a result, Twenty-Nine Palms facilities personnel were unable to assure the LAV-AD Program Manager that adequate facilities would be available when the system was fielded.

LAV-AD Facilities Resolution. In September 1996, representatives from the tenant units; the Twenty-Nine Palms Facilities Management Division; and the Office of the Inspector General, DoD, met to address the LAV-AD facilities issue. As a result, they determined that the LAV-AD required 20 interim sun-shelter spaces, at a cost of \$135,000. The Marine Corps approved the project and estimates completion of the sun shelters by the end of FY 1997. However, the Marine Corps will not construct the maintenance and support area facilities requirements before fielding the LAV-AD in 1998, and Twenty-Nine Palms does not have maintenance facilities that will satisfy the requirement. The lack of adequate facilities will result in performing maintenance in open areas, uncovered and unprotected from the harsh elements of desert environment and on unstable earth surfaces. Thus, Twenty-Nine Palms personnel plan to submit a FY 2000 through 2001 MILCON project to construct LAV-AD maintenance facilities at a cost of \$1.7 million.

Marine Corps officials should ensure before Milestone III that facilities will be in place to support scheduled deployments. The Deputy Chief of Staff, Marine Corps (Installations and Logistics); Marine Corps Systems Command; and Marine Corps operating bases should treat the effects of inadequate facilities support planning as a lesson learned. The facilities support planning issue emphasizes the need for proper facilities planning and coordination among Marine Corps entities before fielding weapon systems. The LAV-AD was the only system that we reviewed that was in the production phase. Therefore, we could not determine whether facilities support planning during the acquisition process was a systemic problem for Marine Corps weapon system acquisitions. In addition, the LAV-AD facilities requirements at Twenty-Nine Palms will be resolved subject to the approval of the MILCON projects. Therefore, we are not making a recommendation. However, we suggest that the Marine Corps Systems Command reemphasize the importance of ensuring that facilities are available when systems are fielded.

Conclusion

While we do not believe that facilities planning is a systemic problem, the Marine Corps should adequately plan and properly implement supportability infrastructure before fielding a weapon system. The goal of the facilities

support planning process is to enhance operational readiness and to ensure system supportability. Marine Corps planning for logistic support infrastructure in unit reorganizations should address facilities support requirements. Although the Marine Corps began facilities support planning as soon as the AAV reorganization was announced, it gave no consideration to support planning during the decisionmaking process. By including facilities requirements in the decisionmaking process, the Marine Corps can make a more informed decision and plan earlier for needed facilities, which can make the facilities available in a more timely manner. Facilities support planning is especially critical because of the long lead required for MILCON funding. In addition, when fielding systems requires significant new construction to support facility requirements, the Marine Corps must have an adequate facilities support plan to ensure that it obtains MILCON funding in a timely manner.

Recommendation, Management Comments, and Audit Response

We recommend that the Commandant of the Marine Corps require the Deputy Chief of Staff, Marine Corps (Installations and Logistics), to address facilities support planning in a timely manner during the decisionmaking process for reorganizations.

Management Comments. The Commandant of the Marine Corps stated that the Marine Corps would continue to plan for facilities using current procedures. He stated that deficiencies did not occur as a result of inadequate planning. Specifically, MILCON funds were not available to solve the identified AAV facilities requirements in a timely manner and that because of new units backfilling existing LAV-AD facilities, a timely MILCON submission was not possible. See Part III for a complete text of management comments.

Audit Response. We do not state that funding had to be in place before a reorganization. We agree that MILCON funds could not solve the AAV facilities' deficiencies before establishing the additional line company and mobility/countermobility platoon. We disagree that the Marine Corps sufficiently planned for facilities. In most cases, proper facilities planning ensures that a system is deployed with the necessary logistics support infrastructure in place; however, Marine Corps officials did not address facilities requirements for the Assault Amphibious Battalion before the reorganization decision. As a result, the AAVs were fielded without the required facilities support in place. Therefore, we request that the Marine Corps reconsider its position on the recommendation and address how it will modify or improve facilities planning procedures for reorganizations during the decision-making process. In addition, please provide an effective date for implementation of the procedures.

We disagree that the Marine Corps originally identified excess facilities to accommodate LAV-AD requirements at Twenty-Nine Palms. The Integrated Program Summary and the Integrated Logistics Support Plan state that a new

minor construction contract, in lieu of MILCON, could address LAV-AD facilities requirements. However, both program documents state that the LAV-AD platoon would require additional facilities. In May 1996, Twenty-Nine Palms personnel stated that existing facilities were available, but the Marine Corps was unable to document that assertion. Later, in September 1996, the Marine Corps said that the LAV-AD would require additional facilities. As a result, the LAV-AD would be fielded without maintenance and support area facilities in place. We acknowledge that the Marine Corps did attempt to plan for facilities during the acquisition process; therefore, our recommendation does not address the issue. We consider the Marine Corps comments to be responsive to the issue and additional comments on the LAV-AD issue are not required. However, the Marine Corps should consider the facilities support planning for the LAV-AD as a lesson learned and ensure that, before Milestone III, facilities will be in place to support scheduled deployments.

Part II - Additional Information

Appendix A. Audit Process

Scope and Methodology

This program results audit was made from March 1996 through February 1997, in accordance with the auditing standards issued by the Comptroller General of the United States as implemented by the Inspector General, DoD. As such, the audit included such tests of management controls as were considered necessary. We reviewed a list of all systems in the Marine Corps' inventory as of March 1996. Then we judgmentally selected a total of 12 systems for review. We reviewed documentation for two systems fielded during FYs 1992 through 1996, five systems undergoing product improvement programs, and five new acquisition programs in Milestones I through III. The fielded systems are the M1A1 tank and the M9 Armored Combat Earthmover systems. The systems undergoing product improvements include the Light Armored Vehicle, the AAV, the M198 Howitzer, the Hercules Recovery Vehicle, and the Hawk Air Defense Missile systems. The systems in development are the LAV-AD, the Tactical Combat Operations, the Predator (Short-Range Assault Weapon), the Lightweight 155 M Howitzer, and the Advanced AAV systems. We also reviewed the acquisition of property to construct ranges to support and train with various weapon systems at Camp Lejeune, North Carolina.

Computer-Processed Data and Statistical Sampling Procedures. We did not use computer-processed data or statistical sampling procedures for this audit.

Contacts During the Audit. We visited or contacted individuals and organizations within the DoD. Further details are available on request.

Management Control Program

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

Scope of Review of Management Control Program. We reviewed the adequacy of Marine Corps management controls over supportability planning for acquisition of new weapon systems and transfer of existing systems.

*DoD Directive 5010.38 has been revised as "Management Control (MC) Program," August 26, 1996. The audit was performed under the April 1987 version of the directive.

Specifically, we reviewed the Marine Corps management controls over the planning for the LAV-AD and AAV facilities support requirements. We did not assess the adequacy of management's self-evaluation.

Adequacy of Management Controls. Marine Corps management controls were adequate in that we identified no material weaknesses over supportability planning for the weapon systems that we reviewed.

Summary of Prior Coverage

Inspector General, DoD, Report No. 93-116, "Acquisition of Advanced Assault Amphibious Vehicles," June 18, 1993, discusses problems with completeness of the mission area analysis, consideration of human factors in the design, compliance with competition in contracting procedures, duplication in design efforts, lack of oversight over and independent testing of product improvements, and lack of adequate management controls. The report made recommendations addressing those issues.

The Navy partially agreed with the findings, noting that the Advanced AAV program was in an early acquisition stage and that some of the issues were to be adequately addressed in due course. In addition, the Navy took action to remove responsibility for the in-service AAV from the AAV Program Office and reassigned it to the Marine Corps Systems Command to provide a better focus for both programs.

Appendix B. Other Supportability Issues

AAV Program Alternatives

AAV History. The Marine Corps fielded the Advanced AAV in 1972 and conducted a selective life-extension program in FY 1982, extending the AAV life expectancy to FY 1996. As defined in the approved Advanced AAV Mission Need Statement for August 1988, the Advanced AAV is currently the replacement system for the AAV. The Advanced AAV is scheduled to be fielded during the 2008 to 2014 timeframe. Thus, the AAV will remain in the fleet for approximately 15 years longer than its original service life. Currently, the Marine Corps is deciding whether to conduct a reliability, availability, maintainability (RAM)/Rebuild program on the aging AAV fleet or to continue the Inspect, Repair Only as Necessary (IROAN) program on the AAV.

AAV Analysis Study. The Marine Corps completed cost-analysis studies in 1995 and 1996 that recommended that the AAV Program Manager and the Marine Corps Logistics Base Albany, Georgia, propose funding for the RAM/Rebuild program in FY 1998. The studies showed that continuing the status quo (271 vehicles per year in the IROAN program) would lead to unacceptable cost growth. If funding were kept to the current level, fewer vehicles per year could be processed, leading to decreasing AAV readiness. The study showed that return-on-investment on the RAM/Rebuild program of 1322 AAV vehicles is achieved in 6 years. Also, the RAM/Rebuild program offers cost avoidance of \$10 million (2 percent) over the Program Objective Memorandum 1998 period. Over the remaining AAV life cycle, the RAM/Rebuild program provides a cost avoidance of \$419 million (39 percent) compared with the standard IROAN.

Inspect, Repair Only as Necessary. IROAN is a technique in which the Services complete only the minimum repairs necessary to restore equipment, components, or assemblies to the prescribed maintenance standard. The fleet of AAVs has been through the IROAN process at least three times since its inception in 1972. The current plan is to IROAN each AAV every 3 years. Approximately 29 percent of the fleet, 386 of the 1322 vehicles, is budgeted to go through the IROAN program each year. The total cost for the IROAN program for FYs 1997 through 2010 is about \$1.1 billion.

RAM/Rebuild. The RAM/Rebuild program is designed to return the vehicle to its original standards. Under the RAM/Rebuild program, the Marine Corps plans to replace suspension and engines systems with Bradley Fighting Vehicle derivative systems. It will also require rebuilding the remainder of the vehicles to "like new" standards. The transmissions are currently being modified under the Product Improvement Program. The total cost for the RAM/Rebuild program for the AAV fleet (1322 vehicles) for FYs 1997 through 2010 is approximately \$659 million.

Conclusion. Some type of upgrade will be necessary to keep the vehicles operational until the Advanced AAV is fielded. The study showed that the AAV Program Manager should propose the RAM/Rebuild program because continuing to IROAN a specified number of vehicles per year decreases the readiness and availability of the AAVs and increases maintenance costs. The AAV analysis study is currently being revalidated for completion this fall, as ordered by the Assistant Commandant of the Marine Corps Committee.

M88A2 Hercules Improved Recovery Vehicle

Background. The Hercules is a joint Army and Marine Corps program, with the Army as the lead Service. The M88A2 Hercules recovery vehicle is an improved version of the M88A1 recovery vehicle, designed to support the M1 family of tanks. The program converts current M88A2 assets to the M88A2 Hercules Improved Recovery System. Improvements include increased armor protection and gross vehicle weight, upgraded suspension, a new engine, improved transmission and final drive units, an improved hydraulic system, and an auxiliary power unit to operate recovery systems and impact power tools without operating the engine. The improvements will increase the towing, lifting, winching, braking, and mobility characteristics now lacking on the M88A1 recovery vehicle.

Marine Corps Funding Eliminated. The Marine Corps did not fund the M88A2 Hercules improved recovery vehicle for the 1998 Program Objective Memorandum because it decided that funding for the Advanced AAV, the V-22 Osprey Tilt Rotor aircraft, and other programs had a higher priority. That decision effectively stopped the planned acquisition of 73 Hercules improved recovery vehicles by the Marine Corps, scheduled to begin in FY 1998. Cost for the Marine Corps was \$2.2 million per unit. Initial operational capability would have been realized by second quarter FY 1999, and full operational capability for the Marine Corps was planned for fourth quarter FY 2001. Because of that funding decision, the Marine Corps is now carrying the requirement for the Hercules as an unfunded program. As of September 1996, it was the twenty-fourth of 193 requirements on the Marine Corps Combat Development Command's Marine Air-Ground Task Force Prioritized List of Requirements.

Effect of Not Procuring M88A2. The Marine Corps will need to begin a massive rebuild program of existing M88A1s as a result of not obtaining FY 1998 funding for the program. The Marine Corps would have to rebuild a minimum of 12 vehicles per year at an estimated cost of \$300,000 per vehicle. To maintain an acceptable readiness rate, a total of 36 vehicles would need to be rebuilt for an estimated total cost of \$10.8 million. In addition, the Marine Corps would require 20 additional M88A1 vehicles to allow for a 2-to-1 towing requirement in each tank battalion and the Maritime Prepositioned Float fleet. That requirement, however, is not feasible. Marine Corps Assistant Program Manager inquiries with the Army indicated that no M88A1s are available for transfer and that additional staffing to maintain and operate additional M88A1s

Appendix B. Other Supportability Issues

is not available. As a result of the Marine Corps decision not to fund the Hercules program at this time, the Army will pay an additional \$25.8 million to obtain the 87 M88A2s for its program.

Safety Concerns and Actual Practice. Safety becomes an issue because the M88A1 is underpowered and requires two vehicles to tow one M1A1 tank. Although safety incidents have been avoided, the procedure subjects operating personnel to potential, but as yet undocumented, safety hazards. Using two M88A1s to tow an M1A1 tank creates safety hazards because of slack action and multiple operators. The M88A1 towing hook is too high on the hull of the M88A1, and the M1A1 eyelets are too low on the M1A1 tank. As a result, tow bars are constantly being bent or broken. Consequently, the Marine Corps tank battalions are only using one M88A1 to recover an M1A1 tank. In some cases, another M1A1 tank is used to tow tanks.

Results of Age and Inability to Perform Mission. Analysis of data from the 2nd Force Service Support Group showed that 9 transmissions averaged 177 days in shop, 12 left final drive units averaged 104 days in shop, and 5 engines averaged 161 days in shop. In addition, one M88A1 was in the shop 127 days for engine replacement and 120 days for fire-bottle testing. Analysis of 5 years of data from the 2nd Tank Battalion showed that about six M88A1 engines are replaced each year; the unit cost is \$119,965 per engine, making the annual cost \$719,790. About four transmissions per year are replaced. The unit cost for transmissions is \$91,718, making the annual cost \$366,872. Total annual replacement costs for the items are averaging \$1.1 million. In addition, the average time between failures for engines was 100 hours, and for transmissions, the time was 130 hours.

The 1st Tank Battalion has replaced 17 engines, 12 transmissions, and 11 output reduction units over the past 2 years at a cost of \$3.3 million. According to battalion officials, the M88A1 has proven to be unreliable for operations. The incompatibility of the M88A1 with the M1A1 tank, the age of the M88A1, and the condition that no service life extension programs or rebuild programs have been performed combine to make the M88A1 an unreliable system, according to the officials.

Conclusion. The need for heavy recovery capability is still valid. One Marine Corps official stated that the M88A1 fleet would be unsupportable in about 12 to 24 months because transmissions would begin to fail and the M88A1 does not have spares. As the M88A1 has reached its maximum life cycle, replacement costs will only continue to rise, and the average time between failures will be less. Even with a rebuild program, the M88A1 recovery vehicle will remain underpowered and incapable of performing its mission.

Appendix C. Report Distribution

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Part III - Management Comments

Marine Corps Comments



DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
2 NAVY ANNEX
WASHINGTON, DC 20380-1775

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RFR-10/rfk
14 May 1997

MEMORANDUM FOR THE ACTING DIRECTOR, ACQUISITION MANAGEMENT
DIRECTORATE, DODIG

Subj: AUDIT REPORT ON WEAPON SYSTEM SUPPORTABILITY FOR WHEELED,
TRACKED, AND AMPHIBIOUS VEHICLES IN THE MARINE CORPS (PROJECT
6AG-0029.00)

Ref: (a) ActDirAcqMgtDir memo dtd 17Mar97

Encl: (1) Marine Corps comments

1. The reference transmitted the draft of the subject audit report for review, and requested Marine Corps comments.
2. The Marine Corps generally concurs in the report findings, except for the conclusion that facilities deficiencies were due to inadequate planning procedures. Detailed comments are at the enclosure.

A handwritten signature in black ink, appearing to read "R. F. Kassel".

Robert F. Kassel
By direction of the
Commandant of the Marine Corps

MARINE CORPS COMMENTS
ON
DODIG DRAFT AUDIT REPORT
ON
WEAPON SYSTEM SUPPORTABILITY FOR WHEELED,
TRACKED, AND AMPHIBIOUS VEHICLES IN THE MARINE CORPS
PROJECT #6AG-0029.00

FINDING. The auditors found that overall supportability planning for the Marine Corps tracked, wheeled, and amphibious weapon system programs was effective for the 12 systems they selected for review. However, they concluded that the Marine Corps did not fully plan for facilities to support the Assault Amphibious Vehicle (AAV) and the Light Armored Vehicle Air Defense (LAV-AD) program.

MARINE CORPS RESPONSE. Generally concur in the finding, except for the following:

Page 3, last paragraph. The Marine Corps is unaware of any canceled funding. Rather, \$80M of development projects are planned, over a 10-year period, for development of GSRA as a training resource for the Marine Corps.

Page 4, Guidance. There is a focus only on facilities with no guidance directives cited for the weapons systems procurement (and support) process. Only MCO P11000.12C (Facilities Planning/Programming) was referenced. Since facilities are supportive of the operational mission, guidance policy on operational procurement should also be shown. Accordingly, the following directives should have been included in the audit with facilities support discussed as a subset of those policies:

- MCO 3500, COMBAT DEVELOPMENT PROCESS
- MCO P5000.10 SYSTEMS ACQUISITION MANAGEMENT MANUAL
- MCO P4105.3 INTEGRATED LOGISTICS SUPPORT MANUAL

Page 4, Planning for New AAV Units . Nonconcur in the statement that "Planning for and funding of the necessary facilities to support the reorganization for AAVs were inadequate." Planning was sufficiently accomplished. The problem was that MILCON funds, scarce in magnitude and fiercely competitive within the Marine Corps, could not be brought to bear to solve identified AAV facilities deficiencies in time. This project is included in POM 2000 for funding.

Page 6, Lessons Learned: LAV-AD Acquisition. Nonconcur in the statement that "The Marine Corps did not address or plan for facilities for the LAV-AD companies before the Milestone III production decision." Facilities supporting the LAV-AD at Twentynine Palms were planned in advance of the operational requirement. Excess facilities were originally envisioned to accommodate LAV-AD requirements at Twentynine Palms. In this light, any new construction would have overbuilt the requirement and wasted scarce MILCON funds. However, new/additional FMF units backfilled the excess facilities and created the LAV-AD deficiencies

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Revised

Final Report
Reference

Page 6

noted in the report. This unexpected event precluded timely POM 98 MILCON submission. Accordingly, supporting construction could not be presented for consideration by HQMC until the POM 2000 cycle.

Page 6, LAV Facilities Support Requirements. It is misleading to indicate that the Integrated Program Summary (IPS) and the Integrated Logistics Support Plan (ILSP) were contradictory in their identification of facilities support requirements. As noted in the first paragraph on page 7, the IPS was the governing document for the milestone III review, and the IPS data concerning facilities was correct at that time.

RECOMMENDATION. "We recommend that the Commandant of the Marine Corps require the Deputy Chief of Staff (Installations and Logistics) to address facilities support planning in a timely manner during the decisionmaking process for reorganizations".

MARINE CORPS RESPONSE. As noted above, deficiencies in facilities support occurred not due to a lack of planning, but rather due to unforeseen external factors (i.e., budgetary constraints and unassociated troop realignments). The Marine Corps will continue to plan for facilities support using current procedures, and will modify and improve these procedures where warranted.

APPENDIX B. OTHER MATTERS OF CONCERN

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Page 16, Additional Greater Sandy Run Area Issues. FAA Washington approval is anticipated. In the meantime, a controlled firing plan has been established to allow full artillery firings in advance of Washington approval. This would allow the FAA Wilmington and Atlanta offices to approve, with controls set in place, firings of the 120 MM, 105 MM, 40 MM, 25 MM, 50 cal, 7.62 MM, and 5.56 MM projectiles. Accordingly, the GSRA ranges can be used for their intended purpose.

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Page 17, Funding, last sentence. The master development plan for GSRA expects full development to occur, eventually, as weapons systems and supporting MILCON/R2 projects come on line.

Audit Team Members

This report was prepared by the Acquisition Management Directorate,
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