UNITED STATES MARINE CORPS
MARINE CORPS COMBAT DEVELOPMENT COMMAND
QUANTICO, VIRGINIA 22134-5001

IN REPLY REFER TO:

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From: Commanding General, Marine Corps Combat Development Command, 3300 Russell Road, Quantico, Virginia 22134-5001 (C 445)

Subj: OPERATIONAL REQUIREMENTS DOCUMENT (ORD) FOR THE ADVANCED MINE DETECTOR (AMD) (NO. LOG 214); CHANGE 1

Ref: (a) CJCSI 3170.01B

Encl: (1) Operational Requirements Document (ORD) for the Advanced Mine Detector (AMD) (NO. LOG 214); Change 1

1. Purpose. To publish the approved changes to the basic ORD for the Advanced Mine Detector (AMD) (NO. LOG 214).

2. Action. Per the reference, replace the basic ORD for AMD with the enclosure.

3. Filing Instructions. This change transmittal will be filed immediately following the signature page of the basic ORD.

4. Point of Contact. The Marine Corps point of contact for this requirement is the Ground Combat Element Branch (C 443), Equipment Requirements Division, Marine Corps Combat Development Command, commercial (703) 784-6206 or DSN 278-6206.

L. A. BLASIOL
By direction

Distribution:
See attached

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OPERATIONAL REQUIREMENTS DOCUMENT (ORD) CHANGE 1

FOR THE

ADVANCED MINE DETECTOR (AMD) (NO. LOG 214)

1. General Description of Operational Capability

a. Mission Area (MA). This requirement relates to the first and second priority deficiencies for MA Analysis 26, Engineering, reviewed 4 February 1998 which recommends support for technological development to detect, breach, clear, reduce, and mark minefields and other obstacles in support of expeditionary operations.

b. System Description. The AMD must be a man-portable system capable of detecting both metallic and nonmetallic buried mines regardless of fuze types. Potentially, this system will be employed on future unmanned ground vehicles configured for remote or semiautonomous operation.

c. Operational Concept. During amphibious and expeditionary operations, the system must rapidly and accurately detect mines and buried ordnance when expanding assault lanes and clearing other areas of explosive hazards.

d. Support Concept. The system must be supported within the existing Department of the Navy three-level maintenance concept (organizational, intermediate, and depot) using common tools and general purpose test equipment to the maximum extent possible. This system must be supportable within the Marine Corps supply system.

e. Mission Need Statement (MNS). This requirement is supported by MNS number LOG 214 dated 21 September, 1992, for a Mine Detector.

2. Threat. The system threat assessment is promulgated in the Marine Corps Mid-Range Threat Estimate (1995-2005) of November, 1994.

a. Threat to be Countered. The AMD will be employed to detect mines.

b. Projected Threat Environment. Mine warfare is inexpensive and can use low technology, making it widely available even to nonprofessional armies or terrorist groups. Mine warfare is applicable throughout the battlefield, with few places where mines cannot be deployed. Mines may be deployed in such areas as open fields, dense undergrowth, brush areas,

forests, roadways, rivers, swamps, beaches, under snow, or in urban areas. These areas can be either in combat or noncombat areas.

(1) Countermine operations in combat areas involve minefield breaching, route sweeping, and mine clearing. Under combat conditions, minefields and harassment mines can be expected to be protected by covering fires from small arms, crew served weapons, direct fire weapons, or indirect fire systems posing a threat to the mine detector operator. Though seldom used in minefield breach operations, a man-portable mine detector is the mainstay for route sweep and mine clearing operations.

(2) The AMD will also operate in noncombat situations such as general mine clearing operations in secured areas, Military Operations Other Than War (MOOTW), or military range remediation.

3. Shortcomings of Existing Systems. Currently, there is no system fielded that provides the capability for detecting nonmetallic mines.

a. Current. The AN/PSS-12 mine detector detects metallic objects only. This system detects low-metallic content mines to varying degrees, depending on mine orientation, soil type, and weather condition.

b. Projected. The U.S. Army is currently developing a system with similar capabilities. The Handheld Standoff Mine Detection System ORD was signed on 31 July 1995. This system may, or may not, meet the requirements established in this document.

4. Capabilities Required

a. System Performance

(1) Mission Scenario. The AMD will be deployed to an area of operation by air (military and commercial transport aircraft), sea (amphibious, maritime prepositioning, and commercial ships), and ground tactical and commercial vehicles. In amphibious operations, the system will be transported ashore by a variety of aircraft and landing craft and will be moved in-theater by all types of surface transportation and aircraft to the area of employment, as needed. The system will detect mines in designated areas throughout the theater to expand breach lanes, to help clear needed land, or to support humanitarian relief efforts. This scenario is applicable across the spectrum of conflict, to include MOOTW.

(2) Employment Tactics. The AMD will be employed by Combat Engineer units in the Marine Division, by Engineer Support Units in the Force Service Support Group, and by Support Squadron

Units in the Marine Aircraft Wing within the Marine Expeditionary Force (MEF), as directed, in order to fulfill operational mine detecting requirements.

(3) Environmental Conditions. The AMD must function effectively in hot and basic climatic conditions, as described in Army Regulation 70-38. The system must function in combat conditions, such as high humidity, sand, dust, fog, or salt water. This system will operate under full solar radiation or at night.

b. Parameters

Ordnance Detection. The AMD must:

1 Detect 90 percent (threshold), 100 percent (objective) of all surface laid or buried blast type (M14) antipersonnel mines to a depth of 3 inches to the bottom of the mine (threshold), 6 inches (objective) and blast fragmentation type (M16A2)AP mines to a depth of 6 inches to the bottom of the mine(threshold) and 8 inches (objective). The capability to detect trip wires and command detonation firing wires is also an objective.

The rationale for this change is to clarify the detection depth required for different types of AP mines. The blast type AP mines are generally surface-laid or buried within two inches of the surface. The explosive will be within 3 inches of the ground surface. The blast fragmentation type AP mine is larger in size and may be buried slightly deeper, but has a high metal content and has 1 pound of explosive to allow for detection.

2 Detect 90 percent (threshold), 100 percent (objective) of all surface-laid or buried antitank mines to a depth of eight inches to the bottom of the mine (threshold), 14 inches (objective).

3 Have a false alarm rate no greater than three false alarms per five square meters (threshold), one false alarm per five square meters (objective).

4 Detect and verify the location of ordnance with an accuracy of 0.15 meters.

5 Provide audio and visual signals to the operator for both mine detection and system status (to include a low battery warning). These signals must be obvious only to the operator. They must not indicate the operator's position to other personnel during daylight or darkness beyond 50 meters. The detection and system status signals must be discrete.

6 Have both audio and visual real-time signals that indicate mine locations after ordnance is sensed.

7 Allow the operator to detect ordnance from standing, kneeling, and prone positions (threshold).

8 Operate under conditions of natural (rain, snow, fog, darkness) and man-made (dust, smoke) obscuration. The AMD will meet all other system performance requirements, under these conditions.

9 Detect buried AT mines at a depth of 6 inches to the bottom of the mine in fresh or saltwater up to 12 inches deep and continue to function properly after the search head has been submerged for 30 minutes (threshold), 90 minutes (objective).

The rationale for the change is to better clarify the requirement for underwater detection. The detector must be capable of detection in both fresh and saltwater as the detector may be utilized for beach landing zone clearance missions, as well as clearance of inland fording sites. Based on threat assessment, most AT mines will be buried no deeper than 150mm (6 inches) to maximize penetration.

10 Have a Built-In Test (BIT) that incorporates both a manual and an automatic self-test capability. The manual self-test must clearly indicate either that the system is working properly or malfunctioning. The automatic self-test must occur at least every 60 seconds, must not impede ordnance detection, and must indicate only malfunctions to the operator. If malfunctioning, the BIT must provide troubleshooting steps on the visual display with sufficient information to preclude the need to review external references.

11 Weigh no more than 35 pounds, less carrying case (threshold), 20 pounds (objective).

12 Operate on common, commercial batteries available in the Marine Corps and Army supply systems.

13 Not restrict the operator's movement or wear of countermine body armor, Mission Oriented Protective Posture (MOPP) gear, cold weather gear, or wet weather gear.

c. Logistics and Readiness

(1) Reliability. Mean time between operational mission failures must be a minimum of 500 hours.

(2) Availability

(a) The AMD must have an operational availability of .95 (threshold), .98 (objective).

(b) The AMD must have a service life of 20 years.

(3) Maintainability

(a) Preventive Maintenance (PM). Preventive maintenance will be performed weekly. Mean time to perform PM must be ten minutes or less at the organizational level. The AMD must be maintainable by the operating unit without contractor support to meet the reliability and availability criteria above. The AMD must incorporate a BIT for the operator that provides troubleshooting steps on the visual display with sufficient information to preclude the need to review external references.

(b) Corrective Maintenance. Maintenance on the AMD will be conducted in accordance with the maintenance categories and echelons contained in Marine Corps Order P4790.1A, Marine Corps Integrated Maintenance Management Systems Introduction Manual. At the organizational level, the mean time to repair must not exceed 30 minutes. Existing common tools, organizational sets, kits and Test Measurement Diagnostic Equipment (TMDE) will be used to the maximum extent possible. The AMD must incorporate a BIT for the maintainer that diagnoses and displays malfunction and corrective information for major components and key sub-components.

(c) Other System Characteristics

1 Wartime Reserve Modes. None anticipated.

2 Nuclear, Biological, and Chemical Contamination

a The AMD is not required to survive high-altitude electromagnetic pulse in stored or operational configurations.

b The AMD must be capable of being decontaminated to negligible risk and hardened against both contaminants and decontaminants. Personnel wearing MOPP equipment levels 1 through 4 must be able to operate and maintain this system.

3 Protective Coating

a Painting. All metal or plastic surfaces not normally painted must be treated to provide a non-reflective surface. The system must be capable of decontamination with standard noncorrosive chemical decontaminants and standard decontamination procedures.

b Corrosion Control. The system must be designed and treated for corrosion resistance. Corrosion resistance must

be sufficient to ensure serviceability over the service life of the system under normal operating conditions and be compatible with decontamination procedures.

c Combat Identification. The AMD does not require a combat identification capability.

5. Program Support. The Joint Potential Designations are: U.S. Army (Joint Interest), U.S. Navy (Joint Interest), and U.S. Air Force (Joint Interest).

a. Maintenance Planning. The AMD must be organizationally maintainable by operating units without contractor support. Self-diagnostics and modular component replacements are required at the operator level. Operator/Maintainer inspection will be provided by existing operators/maintainers at the user sites employing personnel Military Occupational Speciality (MOS) 1371. At the Intermediate and Depot levels, the AMD will be repaired by MOS 2841. New Equipment Training Teams will be provided prior to fielding the AMD to assist the receiving units in establishing a maintenance knowledge base.

b. Support Equipment

(1) Standard Support Equipment. The AMD must be designed for compatibility with existing standard engineer support equipment, common tools, organizational sets, and kits to the maximum extent possible and should not require any new special tools to the greatest degree practical (threshold), no new specialized tools (objective).

(2) Test and Fault Isolation Capabilities. New TMDE for the AMD should be kept to a minimum. Any TMDE must augment and not replicate BIT functions. Pre-mission function checks must be accomplished in less than two minutes.

c. Human Systems Integration

(1) Manpower Constraints

(a) Operators. MOS 1371 personnel will operate the AMD. The system must accommodate the range between a 5th percentile female and 95th percentile male Marine wearing cold weather garments or MOPP 1 through 4 protective garments.

(b) Maintenance Personnel. Operator maintenance will be performed by operators at the unit level through modular component replacement. Maintenance at the Intermediate and Depot levels will be performed by MOS 2841.

(2) Training Concept. Initial operator training will be conducted by the manufacturer at the using units. Some changes

to current training for mine detector maintenance are foreseen pending the final design of the AMD. Initial unique maintenance training will be coordinated through the producing contractor. The responsibility for initial training is the Marine Corps Engineer School (MCES), Camp Lejeune, North Carolina for MOS 1371 operators and at the Marine Corps Communications and Electronics School, Twentynine Palms, California for MOS 2841 Repairers.

d. Computer Resources. As required for self testing. All systems and components necessary must be fully functional in all operating environments and conditions without requiring special maintenance. The AMD computer resources must be Defense Information Infrastructure Common Operating Equipment compliant. The use of commercial off-the-shelf hardware/software is highly encouraged.

e. Other Logistics Considerations. There are no unique facility or shelter requirements; nor special handling, packaging or transportation considerations currently anticipated. Logistics Assessment Reviews will be conducted by the project manager to ensure that adequate repair parts, level IV detailed engineer data and appropriate level technical manuals for operators and maintainers be provided as part of the provisioning package prior to distribution of the AMD.

f. Transportation and Easing. The AMD can be expected to be moved intra-theater and inter-theater by virtually any military or commercial transportation method.

(1) Movement. The AMD must be transportable by all:

(a) Highway (commercial cargo and utility vehicles) and rail modes.

(b) Military and commercial transport aircraft.

(c) U.S. Navy amphibious ships, Landing Craft Utility and Landing Craft Air Cushion, Maritime Prepositioning Ships, and other commercial shipping (roll-on/roll-off).

(d) Tactical wheeled or tracked vehicles.

(2) Basing. Basing and storage requirements for the AMD are anticipated to be comparable to those used for the current mine detector.

g. Standardization, Interoperability, and Commonality. To the maximum extent possible the design of AMD must incorporate standardized components and parts for all assemblies.

SUBJ: OPERATIONAL REQUIREMENTS DOCUMENT (ORD) FOR THE ADVANCED MINE DETECTOR (AMD) (NO. LOG 214)

(1) Joint Use. There is a strong potential for use of the AMD by other armed Services; however, no specific additional requirements are anticipated for Joint use.

(2) Energy Standardization. See paragraph 4.a.(4)(b)3 above.

(3) Joint Technical Architecture (JTA). The AMD will be in compliance with all applicable standards within the Department of Defense JTA to include, but not limited to, information processing and human-computer interface standards.

h. Mapping, Charting, and Geodesy Support. Not required.

i. Environmental Support. PM procedures are anticipated to change slightly based on varied operational environments. These changes are anticipated to be similar to those provisions made for the current mine detector.

6. Force Structure. Unit distribution:

1stCEB	72		
2d CEB	72		
CBTASLTBN	30		5 Platoons
CBTASLTCO (Hawaii)	6		
4th CEB	72		
Total		252	
7th ESB	36		
8th ESB	42		(3) Leter Co.+ Bridge Co.
9th ESB	12		
6th ESB	36		
Total		126	
1st MAW	8		
2d MAW	16		
3d MAW	16		
4th MAW	16		
Total		56	
TBS	2		
MCENGRSCOL	14		
Total		16	
MPS 1	44		
MPS 2	44		
MPS 3	44		
Total		132	
Total AO		582	

The rationale for AO change is to provide acquisition numbers that have been validated by the commands. The original ORD

numbers could not be justified. The AAO Tailoring Board recently approved an AAO of 585.

7. Schedule Considerations

a. Initial Operational Capability (IOC). IOC is achieved when I MEF has received 62 systems, II MEF has received 65 systems, III MEF has received 28 and the MCES has received 7 systems. This requirement includes initial provisioning of spare parts and all necessary training for operators and maintenance personnel.

The rationale for the quantity changes in IOC is to reflect IOC as half of the required active duty systems on-hand.

(1) IOC. Fiscal Year (FY) 2008.

(2) Impact if IOC is Not Met. Failure to achieve IOC will further deny operating forces the ability to detect non-metallic mines.

b. Full Operational Capability (FOC). FOC is reached when all systems and requisite spare parts have been fielded and initial operator and maintenance training has been completed.

(1) FOC. FY09.

(2) Impact if FOC is Not Met. Same rationale as failure to achieve IOC.

The rationale for changes to IOC/FOC are based upon fiscal constraints and slow technology evolution.