AD-A192 023 REQUIRED OPERATIONAL CAPACITY FOR A 7-1/2 TON CAPACITY AIR MOBILE CRANE (AMC)(U) MARINE CORPS WASHINGTON DC R M FRANKLIN 24 NOV 87 USM-ROC-LOG-215.1.7 1/1

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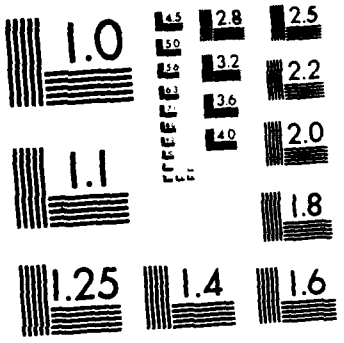

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
WASHINGTON, D.C. 20380-0001

IN REPLY REFER TO

3900
RDD241103nB
2 4 NOV 1987

From: Commandant of the Marine Corps

Subj: REQUIRED OPERATIONAL CAPABILITY (ROC NO. LOG 215.1.7) FOR A 7½ TON CAPACITY, AIR MOBILE CRANE (AMC)

Ref: (a) MCO 3900.4B

Encl: (1) ROC NO. LOG 215.1.7 (AMC)

1. In accordance with the procedures set forth in the reference, ROC NO. LOG 215.1.7 is hereby promulgated.

2. Points of contact regarding inquiries relative to this ROC are:

a. Commanding General, Marine Corps Research, Development and Acquisition Command, Quantico, Virginia.

b. Commanding General, Marine Corps Combat Development Center, Quantico, Virginia.

Distribution:
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RAY "M" FRANKLIN
Major General U.S. Marine Corps
Deputy Chief of Staff for RD&S

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REQUIRED OPERATIONAL CAPABILITY NO. LOG 215.1.7
FOR A
7 1/2 TON CAPACITY, AIR MOBILE CRANE (AMC)

1. STATEMENT OF REQUIREMENT. The Marine Corps has a requirement for an Air Mobile Crane (AMC) capable of lifting 7 1/2 tons minimum and swinging 360 degrees while on outriggers. The AMC will be required to drive-on, drive-off a C130 aircraft fully assembled and will be of the rough-terrain style of cranes that feature rubber tires and a hydraulic boom. The AMC will be required to arrive with the fly-in echelon (FIE) and operate within the ammunition supply point (ASP), on and off airfield runways, and over unprepared and uneven surfaces to include sand, snow, and mud. The required initial operational capability (IOC) is FY90. The desired full operational capability (FOC) is FY92.

2. THREAT AND OPERATIONAL DEFICIENCY

a. Threat. The threat confronting the Marine Corps is outlined in the Marine Corps Long Range Plan (MLRP) of 6 June 1982 and the Marine Corps Midrange Objectives Plan (MMROP) of 8 November 1984. A specific threat does not exist which would be countered by the AMC.

b. Operational Deficiency. The AMC will replace the 7 1/2 ton cranes (TAMCN: B0444 and B0045) which are presently in the Marine Corps inventory and are nearing the end of their service life. The AMC will also replace the 3 ton crane (U3033) currently being held only for contingencies.

3. OPERATIONAL AND ORGANIZATIONAL CONCEPTS

a. The AMC will be utilized by the engineer battalions, Marine wing support squadrons, and landing support battalions to support the movement of shelters, vans and containers weighing up to 15,000 lbs, and to support the assembly of munitions within the ASP. It will also be used to handle repair parts, supplies, and equipment. The AMC will be utilized by Marine wing support squadrons to support "fly away" contingencies by being air transportable within the C130 aircraft. The AMC will be utilized to remove the CH-53E rotor head and main transmission. The AMC must be capable of operating in temperatures ranging form -25 degrees F to 120 degrees F, be capable of operating in and near salt water, and be compatible with both amphibious and commercial shipping.

b. Organizational Concept. The AMC will replace the present 7 1/2 ton crane and 3 ton crane in the quantities indicated below. The estimated Marine Corps inventory objective for the AMC is 342. Quantity distribution is as follows:

per Letter

A-1

ACTIVITY	QUANTITY
I MAF	55
II MAF	55
III MAF	58
IV MAF	56
MARITIME PREPOSITIONED SHIP	63
MAB - A - 1	21
OPERATIONAL READINESS FLOAT	9
PREPOSITIONED WAR RESERVE	13
TRAINING REQUIREMENTS	12
TOTAL	342

4. Essential Characteristics. The AMC is to be a commercial non-developmental item (CNDI) and will incorporate state-of-the-art technology to increase reliability, availability, maintainability, and service life expectancy.

a. AMC Performance Characteristics: The AMC will:

(1) Have a maximum curb weight that does not exceed 26,000 lbs.

(2) Be capable of lifting at least 15,000 pounds at 13 foot radius on outriggers. The AMC must be able to lift the maximum load at any point within 360 degrees, without interference from the crane structure. Swing will be defined as 360 degree rotation at a speed of at least 1.5 revolutions per minute (rpm).

(3) Be capable of being air transported in a single sortie by C130 and larger aircraft and externally by the CH-53E helicopter. All mil-standard requirements for helicopter external lift will be met. Assembly/disassembly of parts or components for air transport will not be required. The AMC must meet all air transportation requirements of DH 1-11 for ramp loading and angles.

(4) Be equipped with an anti two-block lock-out system to prevent damage to the boom, hook, and sheaves.

(5) Have clearances/measurements no greater than 96 inches width, 102 inches high, 27 feet overall length.

(6) Have a ground clearance of 14 inches or greater.

(7) Be equipped with service brakes capable of stopping the vehicle within 40 feet at 20 miles per hour (mph) and capable

of holding the crane on a 45 percent slope. The parking brake must be capable of restraining the crane on a 20 percent slope.

(8) Be capable of attaining a speed of 20 mph on improved surfaces and a minimum of 6 mph on unimproved rough terrain conditions, all wheel drive. The AMC must negotiate a 30 percent slope at a speed of at least 1.25 mph.

(9) Be capable of negotiating an angle of approach and departure of 30 degrees.

(10) Have a safety warning device that sounds when the AMC is placed in reverse gear.

(11) Ford 30 inches of salt water without the use of a fording kit. An engine fan clutch may be used to meet fording requirements.

(12) Be equipped with selected modes for front wheel, all wheel, and crab steering. An in-the-cab indicator shall show, at a glance, the steering position of the rear wheels. Also, the AMC must execute a 180 degree turn within a curb-to-curb clearance circle of 40 feet.

(13) Be capable of starting and operating in all climatic categories with ambient temperatures from -25 degrees F to 120 degrees F and in rain up to 4 inches per hour. The use of a winterization kit may be required. The winterization kit will consist of at least a personnel heater, a battery warmer, engine oil warmer, fuel pre-heater, window defroster, and four tire chains.

(14) Be equipped with an environmentally controlled, enclosed cab. The enclosed cab is required to enhance operators' performance in extreme climates and must be of sufficient size to permit full mission performance by personnel (5 percent female to 95 percent male percentile) wearing the complete NBC protective ensemble, environmental protective clothing, or upper body armor, lower body armor, and helmet. The cab doors must be capable of being secured/latched in the open position. The cab "glass" must be capable of repelling the weight of the hookblock for operator protection. A cab mounted rifle rack capable of accommodating the M-16 rifle is required to secure the operator's weapon.

(15) Be within the minimum commercial standards as defined by the Power Crane and Shovel Association for cranes of its class.

(16) Be capable of providing adequate operator lighting for night operation, as well as flood lighting that rotates with the boom assembly. Adequate driving and blackout lights shall also be provided for over-the-road travel.

(17) Be equipped with a 24-volt negative-ground electrical system. The battery compartment must be accessible once loaded aboard an aircraft. The AMC will feature the NATO standard electrical slave receptacle.

(18) Be equipped with an on-demand four wheel drive capability, a power shift transmission and a diesel engine. The engine must have a cold weather starting aid. The exhaust system must be capable of mounting a spark arrestor unless turbo-charged and will be equipped with a rain cab. The engine must be compatible with Simplified Test Equipment - Internal Combustion Engine (STE-ICE) testing system. The AMC must be easily maintained. Design will preclude the requirement for special tools for maintenance/repair. No special mechanical skills will be required at any echelon of maintenance/repair.

(19) Be capable of completing two missions (as defined in par 4b(1)) without refueling and of accepting military standard petroleum, oil, and lubricants (POL).

(20) Be equipped with integral tie-down brackets, a front and rear towing pintle and appropriate lifting eyes. The AMC shall be equipped with axles that can oscillate at least 7 degrees above and below the horizontal axle centerline that can be hydraulically locked to the frame to prevent oscillation.

(21) Be designed to meet applicable DoD human engineering, health, and safety standards and employ "user friendly" features for personnel operating in or near the crane throughout the life cycle. The AMC design and engineering must allow for the certification to handle conventional and nuclear explosives.

(22) Be capable of operation after exposure to chemical decontamination solutions and shall incorporate seals and other synthetic components that are resistant to deteriorating bacteria.

(23) The AMC's minimum lift requirements are: 15,000 lbs at 13 feet radius and 4,000 lbs at 30 foot radius.

(24) Tires must be capable of supporting the load over the front with a pick and carry of 4,000 lbs at 20 feet of boom traveling at 2.5 mph.

(25) The operator must be capable of 360 degree operation without leaving the operator's cab, to include the activation of outrigger controls.

(26) Be compatible with standard commercial spreader bars and a two man maintenance platform for aircraft and other

maintenance. The maintenance platform shall have a leveling control on the platform. The maintenance platform shall be attached to the boom by pins or other secure means.

(27) Be capable of being embarked and disembarked without disassembly aboard all roll on/roll off (RO/RO) ships, the LST, the LSD, and the LPD classes of ships.

(28) Be capable of embarking aboard and disembarking from amphibious ships and craft under its own power.

b. Reliability, Availability, Maintainability, and Durability (RAM-D) Characteristics

(1) Reliability. The AMC System shall demonstrate a Mean Time Between Mission Failure (MTBMF) of at least 15 missions (desire 24). A mission is defined as 1.2 hours of travel and 2.8 hours of lifting. The confidence levels are as follows:

	Confidence Level	Failure	MTBMF
Threshold	70%	0	15
Goal	90%	0	24

(2) Availability. The AMC system shall have an operational availability of 95%. The repair parts turn-around time shall be less than 8.0 hours for mission failures with 85% to 90% of necessary spares located at the organizational and intermediate maintenance level.

(3) Maintainability. The AMC system shall have a maintenance ratio (MR) of no more than .16 maintenance man-hours per mission. The MR reflects the total of both organizational level and intermediate level maintenance actions. Scheduled maintenance shall not be required more often than every 50 hours.

(4) Durability. The AMC system shall be sufficiently rugged in design to successfully complete at least 1,500 mission hours of operation before replacement or rebuild of major components, such as the engine, transmission, power train, and hydraulic system, is required.

5. INTRA/INTEROPERABILITY AND STANDARDIZATION REQUIREMENTS

a. The AMC will operationally interface with the movement of logistics over the shore and the movement of breakbulk cargo and munitions in rear areas.

b. The AMC will operationally interface with the movement of shelters and vans within its lifting capacity and as such must be compatible with standard commercial spreader bars.

c. The AMC will employ the NATO standard electrical slave receptacle and the Marine Corps STE-ICE testing system. The AMC shall be compatible with existing Navy ships and lighterage for water surface movement.

6. RELATED EFFORTS. Both the Army and the Air Force have a military specification for purchase, for a 7 1/2 ton crane. Either document could support a Marine Corps procurement.

a. The Army has awarded a contract for both a Type I airmobile crane that is 102 inches in overall height for use with the C130 within their engineer battalions and a Type II airborne crane that is 96 inches in overall height for airdrops and sectionalized for helicopter delivery.

b. The Air Force has a C130 drive-on/drive off 7 1/2 ton crane.

7. TECHNICAL FEASIBILITY AND ENERGY/ENVIRONMENT IMPACTS

a. Technical Feasibility. The AMC is technically feasible. It is expected that source selection can be made from readily adaptible existing commercial designs with minor modifications to meet military specifications. Although fording of 30 inches of salt water is not a standard commercial requirement/practice, the modification required presents no technological difficulty. The technical risk of fielding the AMC as a CNDI is low.

b. Energy/Environment Impact. The diesel engines that are designed for cranes of this type are commercially available and do not impact adversely upon the environment or upon the consumption of energy.

8. LIFE CYCLE COST FORECAST. The life cycle cost forecast and detailed estimate is attached as Appendix A. The yearly operational hours for the AMC are estimated to be 480 engine hours based on one four-hour mission per day for 120 working days a year (2.5 days x 48 weeks = 120 working days). Life expectancy = 10 years or 4,800 hours.

9. MANPOWER REQUIREMENTS. The AMC will be maintained by the equipment mechanics (MOS 1341) within the existing maintenance structure for engineer material handling equipment. It will be operated by the engineer equipment operator (MOS 1345) within the existing Marine Corps manpower/force structure.

10. TRAINING REQUIREMENTS

a. Training Aids/Devices. As a minimum, engine and transmission cut-aways shall be used during the mechanics' training cycle.

b. Training. Initial training for both operators and maintenance personnel will be provided by manufacturer/factory representatives. Eventually, this training will be accomplished at the appropriate military entry-level service school. With the incorporation of "user friendly" features, the length of a training cycle should remain constant but with a higher productivity per student.

c. Manuals. Commercial operator's and maintenance manuals will be utilized and supplemented by Marine Corps Parts Manuals (SL-3 and (SL-4).

11. AMPHIBIOUS/STRATEGIC LIFT IMPACT. The AMC will impact favorably upon tactical and strategic mobility due its capability of being transported by C130 aircraft without disassembly. There is no impact on amphibious lift as the AMC is approxmately the same square as the current 7 1/2 ton crane.

Major System: AIR MOBILE CRANE (AMC) Date: 04-06-1987

LIFE CYCLE COST FORECAST

FUNDING PROFILE
In Thousands of FY88 Constant Budget Dollars
(FYDP Dollars in Parentheses)
(November 86 Escalators)

10 YEAR LIFE CYCLE

	PRIOR YEARS	CURRENT YEAR	BUDGET YEAR	FY89	FY90	FY91	FY92	FY93	TO COMPL N	TOTAL PROGRAM
Major System										
RDT&E	25	131	0	0	0	0	0	0	0	156
FYDP Dollars	(	126)(	0)(	0)(	0)(	0)(	0)(	0)		
PMC	0	0	11,625	8,040	0	0	0	0	3,856	23,521
FYDP Dollars	(	0)(	11,625)(	8,250)(	0)(	0)(	0)(	0)		
QTYS FUNDED	0	0	200	142	0	0	0	0	0	342
Support										
Support PMC	0	0	67	115	115	115	115	115	513	1,155
FYDP Dollars	(	0)(	67)(	118)(	121)(	124)(	126)(	129)		
MILCON	0	0	0	0	0	0	0	0	0	0
FYDP Dollars	(	0)(	0)(	0)(	0)(	0)(	0)(	0)		
O&MMC	0	0	1,000	1,667	1,667	1,667	1,667	1,667	7,436	16,771
FYDP Dollars	(	0)(	1,000)(	1,707)(	1,741)(	1,772)(	1,804)(	1,827)		
O&MMCR	0	0	114	194	194	194	194	194	872	1,956
FYDP Dollars	(	0)(	114)(	199)(	204)(	209)(	213)(	217)		
MFMC	0	0	300	503	503	503	503	503	2,243	5,058
FYDP Dollars	(	0)(	300)(	504)(	505)(	506)(	507)(	509)		
RFMC	0	0	34	59	59	59	59	59	261	590
FYDP Dollars	(	0)(	34)(	59)(	60)(	60)(	60)(	61)		
NAVY PROC	0	0	0	0	0	0	0	0	0	0
TOTAL PROGRAM	25	131	13,140	10,578	2,538	2,538	2,538	2,538	15,188	49,214
FYDP Dollars	(	126)(	13,140)(	10,837)(	2,632)(	2,671)(	2,711)(	2,753)		

This estimate was prepared by the Analysis Support Branch, Plans Division, MCDEC, Quantico, VA 22134 Auto 278-2235.
#Commencement of PMC funding profile directed by DPO.

Major System: AIR MOBILE CRANE (AMC) Date: 04-13-1987

LIFE CYCLE COST ESTIMATE
(In Thousands of FY88 Constant Budget Dollars)
(November 86 Escalators)

10 YEAR LIFE CYCLE

PHASE/CATEGORY		SUBCATEGORY	CATEGORY	PHASE
I.	RDT&E PHASE			162
II.	INVESTMENT PHASE			24,262
1.	SYSTEM PRODUCTION/PROCUREMENT		24,262	
A.	Major End Item (Contractor)	19,594		
B.	Initial Provisioning/Spares, Repair Parts	3,919		
C.	Government Furnished/Added Equipment	0		
D.	Other Direct System Costs	749		
2.	SUPPORT EQUIPMENT PROCUREMENT		0	
A.	Ammunition	0		
B.	Weapons and Tracked Combat Vehicles	0		
C.	Guided Missiles	0		
D.	Comm-Elec Equipment	0		
E.	Support Vehicles	0		
F.	Engineer and Other Equipment	0		
3.	MILITARY CONSTRUCTION		0	
III.	OPERATIONS AND SUPPORT PHASE			24,790
1.	OPERATIONS		7,470	
A.	Operator Personnel/Training	3,154		
B.	Material Consumption	868		
C.	Energy Consumption	3,447		
2.	MAINTENANCE		15,972	
A.	Organizational Maintenance	6,133		
1)	Personnel/Training	1,397		
2)	Maintenance Material	1,204		
3)	Repair Material	3,532		
4)	Other	0		
B.	Intermediate Maintenance	2,579		
1)	Personnel/Training	510		
2)	Maintenance Material	112		
3)	Repair Material	1,737		
4)	Other	220		
C.	Depot Repair	6,106		
D.	Depot Overhaul	0		
E.	Unprogrammed Losses	1,155		
F.	Software Maintenance	0		
3.	INDIRECT SUPT, BASE OPS & MAINT, OTHER O/H COSTS		1,348	
A.	Base Operations	737		
B.	Other Overhead Costs	611		
4.	SUPPORT EQUIPMENT O&S		0	
TOTAL LIFE CYCLE COSTS				49,214

O&S PHASE--Reserves				2,835
1. OPERATIONS			780	
A. Operator Personnel/Training		330		
B. Material Consumption		91		
C. Energy Consumption		360		
2. MAINTENANCE			1,837	
A. Organizational Maintenance		641		
1) Personnel/Training	146			
2) Maintenance Material	126			
3) Repair Material	369			
4) Other	0			
B. Intermediate Maintenance		269		
1) Personnel/Training	53			
2) Maintenance Material	12			
3) Repair Material	181			
4) Other	23			
C. Depot Repair		638		
D. Depot Overhaul		0		
E. Unprogrammed Losses		289		
F. Software Maintenance		0		
3. INDIRECT SUPT, BASE OPS & MAINT, OTHER O/H COSTS			218	
A. Base Operations		154		
B. Other Overhead Costs		64		
4. SUPPORT EQUIPMENT O&S			0	

END

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