AD-A147 958 REQUIRED OPERATIONAL CAPABILITY (ROC) NUMBER LOG 173 1/2
FOR A MARINE CORPS AUTOMATED TEST EQUIPMENT SYSTEM
(MCATES)(U) MARINE CORPS WASHINGTON DC 03 OCT 84
UNCLASSIFIED USMC-ROC-LOG-1.73 F/G 15/5 NL

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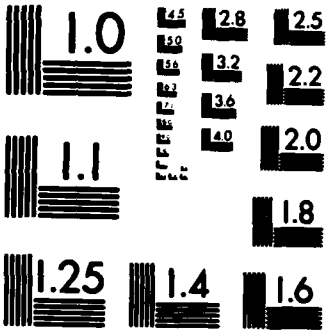

DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
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Subj: REQUIRED OPERATIONAL CAPABILITY (ROC) NO. LOG 1.73 FOR A MARINE CORPS AUTOMATED TEST EQUIPMENT SYSTEM (MCATES)

Ref: (a) MCO P5000.10A

Encl: (1) ROC No. LOG 1.73 for MCATES

1. In accordance with the procedures set forth in the reference, ROC No. LOG 1.73 for a Marine Corps Automatic Test Equipment System (MCATES) is hereby established and promulgated.

2. The Commanding General, Marine Corps Development and Education Command (Director, Development Center), Quantico, Virginia 22134 is the Marine Corps point of contact for any questions pertaining to this ROC and any development efforts pertaining thereto.

Ray M. FRANKLIN
BRIGADIER GENERAL, U.S. MARINE CORPS
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REQUIRED OPERATIONAL CAPABILITY (ROC) NO. LOG 1.73

FOR A

MARINE CORPS AUTOMATIC TEST EQUIPMENT SYSTEM (MCATES)

1. STATEMENT OF THE REQUIREMENT. A major combat service support logistical consideration is the requirement to perform rapid and reliable fault diagnosis of electronic assemblies and subassemblies to ensure operational readiness and subsequent system availability. The MCATES approach is to employ a common task system for several applications. The Automatic Test Equipment (ATE) would be used at the Depot Maintenance Activities (DMA's) and the intermediate-level maintenance organizations in the Fleet Marine Force (FMF). This ATE must be readily adaptable to current maintenance organizations and policies in the FMF in accordance with MCO 4790.1A. An Initial Operational Capability (IOC) is required during FY 85. The Full Operational Capability (FOC) is desired in FY 88.

2. THREAT AND/OR OPERATIONAL DEFICIENCY

a. Threat. Potential enemy threats confronting the United States in the near-to-long-range period are described by the Marine Corps Long Range Plan (MLRP) of May 1982, the Marine Corps Midrange Objective Plan (MMROP) of 29 April 1983, and the Science and Technology Objective 216 (STO). To successfully counter predicted threats, the Marine Corps must be capable of rapid response organized and tailored to general or specific mission needs. The success of combat operations at any level of intensity is directly dependent upon the degree of efficiency and effectiveness of the operational logistics support provided. The ability to communicate, maneuver, and coordinate/direct fire on the enemy can only be assured if the sophisticated weapons and equipment employed by the FMF receive timely and efficient maintenance support.

b. Operational Deficiency. The advent of the microprocessor and its supporting circuitry has precluded the use of manually operated electronic Test, Measurement and Diagnostic Equipment (TMDE) for dynamic testing. A new capability is required to replace manually operated TMDE with state-of-the-art electronic devices.

(1) The rapid advancement in electronic technology has resulted in a proliferation of applications for electronic assemblies/subassemblies. As the number of items to be supported has increased, so have the man-hours of effort and the corresponding skills required to provide proper maintenance

support. These increases have negatively impacted on those technical skills in which the Marine Corps historically has had chronic shortages and difficulty in maintaining end strengths. As a result, the prerequisite experience needed to fully qualify electronic maintenance personnel is frequently lacking in the FMF. ATE readily lends itself to compensating for the lack of experienced maintenance personnel when properly employed in situations where high density maintenance requirements or redundancy in the types of items supported exist. The Marine Corps does not currently possess the necessary ATE which could be used by the FMF in such situations.

(2) The only feasible means to ensure the interchangeability and subsequent system compatability of electronic assemblies/subassemblies are detailed performance testing and maintenance of high quality control standards within the respective commodity areas. These efforts require extensive man-hour expenditures or the effective application of ATE as an alternative. However, the Marine Corps does not currently possess the necessary ATE which can be used to provide this capability to the FMF.

(3) MCO 10510.18A establishes policy and guidelines for ATE in the Marine Corps. This policy establishes the requirement to minimize the variants of ATE within the Marine Corps as the only effective means of reducing life cycle cost, and requires that key components of ATE be identified and established for application where required.

3. OPERATIONAL AND ORGANIZATIONAL CONCEPTS

a. Operational Concepts. MCATES shall incorporate the necessary equipment, computer programs, and associated documentation to enable automatic/semiautomatic testing and fault diagnosis of electronic assemblies and subassemblies. In addition, MCATES shall provide for Test Program Set (TPS) development, verification/validation testing, revision/update, and management procedures. MCATES will be comprised of two functional groups. The first group consists of the test head, instrument controller and associated General Purpose Electronic Test Equipment (GPETE). The second group, the Test Program Set Development and Management System (TPSDMS), will be located at the DMA, MCLB, Albany, Georgia. The key elements in this group will be a central host computer, digital test program generator, TPS programming stations, documentation stations, configuration management stations, and verification/validation stations. A variety of software operating systems, application packages, compilers, and support utilities will be included with the system hardware.

b. Organizational Concepts. There will be at least two basic configurations of the MCATES test station.

(1) The primary test station configuration will consist

of an instrument controller, a specifically configured suite of GPETE, a testhead, and associated interface/signal cables and connectors/adapters. This configuration shall be utilized by Marine Corps DMA personnel and selected intermediate-level field activities in two principal modes of operation: go/no-go testing and fault diagnosis. This station must be capable of being rapidly configured and reconfigured to test a variety of electronic assemblies and subassemblies, as the operator will be testing and repairing a wide range of electronic assemblies/ subassemblies and components when engaged in the fault diagnosis mode of operation.

(2) The alternate test station configuration will be the same as the primary test station except that a MCATES testhead shall not be included. This station will be utilized by Marine Corps personnel at selected field activities primarily for semiautomatic assembly level testing of Units Under Test (UUT's) not requiring the extensive switch-matrix capability of a testhead, or for limited applications of semiautomatic testing of a UUT that exceed the capabilities, or where the use of, a testhead is impractical.

(3) The inventory objective for MCATES (controllers and testheads) will be for approximately 190 units.

4. ESSENTIAL CHARACTERISTICS

a. Capability. The MCATES shall exhibit the following characteristics when used in conjunction with appropriate IEEE 488 compatible GPETE:

(1) Consist of an instrument controller, testhead, GPETE as required, associated interface/signal cables and connectors/adapters, and required peripheral support items (i.e., printer, modems, etc.).

(2) Be capable of being configured into specific testing stations to satisfy varying user needs.

(3) Be capable of expanded testing capabilities to meet current and projected testing requirements.

(4) Operate with a DOD approved high-order ATE language.

(5) Provide hard copy printouts of diagnosis and performance data.

(6) Be capable of being utilized 23.5 hours/per day, with 30 minutes per day devoted to scheduled maintenance.

(7) Possess a self-test capability to fault isolate to a single card or module level 90% of the time and no more than a 3 card/module level the remaining 10% of the time.

(8) Be capable of providing under algorithm control, the capability for stimulus and response measurements of waveforms (sine, square, triangle, sawtooth, and complex) and pulses (independent sources with programmable pulse width, period, delay rise/fall times/amplitude, offset and polarity). Multiple independent pulse sources shall be usable simultaneously.

(9) Be stable and insensitive to shock and vibrations caused by the movement of personnel within the shelter/van, the opening and closing of doors and drawers, or by operation of air conditioners and power generation equipment.

(10) Require no more than two hours for teardown or set-up when relocating.

(11) Provide maximum safety for personnel and equipment during the storage, transportation, operation and maintenance modes.

(12) Achieve the most efficient man/machine interface practical for the performance of the mission.

(13) Provide a means for reloading the operating system and applications program software.

b. Statement of Pre-Planned Product Improvement (P3I). It is estimated that after approximately five years the technology will have progressed to the point where an upgrade of the controller (CPU) and testhead elements may be required.

c. Suitability Objectives

(1) Reliability. The system will demonstrate a minimum Mean-Time-Between-Failures (MTBF) of 2000 hours, excluding calibration.

(2) Availability. An operational availability of 85% will be acceptable for sustained field operations. An operational availability of 90% will be minimally acceptable for garrison operations.

(3) Maintainability. The maintenance ratio of active maintenance man-hours to operating hours will not exceed 0.05. This includes all scheduled and unscheduled maintenance at all levels. The system shall have a Mean-Time-To-Repair (MTTR) of less than one hour.

(4) Transportability. The MCATES will be deployable in a transportable shelter. Since all hardware is to be commercial off-the-shelf equipment, it may be required that the test set be packed into environmental, shock, and vibration protective transit cases during shelter relocation or shipment.

(5) Vulnerability. MCATES must be capable of providing

the full range of support, without disruption of service or function, for a minimum of 16 hours per day, five days per week in garrison, and sustained operation of 20 hours per day for 90 day periods in the field. This excludes disruptions of service caused by inadvertent or accidental damage not incurred as a result of normal handling or operation.

(6) Survivabilility. It is necessary that the MCATES be capable of continuous operation in an environment which has been contaminated by NBC attack. This capability, however, will be primarily driven by personnel precautions and/or protective measures which are extraneous to the MCATES.

d. Facilities. MCATES will require no unique or dedicated facilities. The system will function in the standard family of electronic maintenance shelters or in a normal electronic maintenance shop environment when in garrison or at posts or stations.

5. INTRA/INTEROPERABILITY AND STANDARDIZATION REQUIREMENTS

a. Intra/Interoperability. MCATES will be capable of operating on the standard power panel included in the EMC shelter and on 60 Hz or 50 Hz prime power when at posts or stations.

b. Standardization Requirements. All GPETE used with MCATES will be IEEE compatible. In order to achieve the maximum additional, secondary benefits from automation of test equipment, MCATES will be capable of interfacing with supply and maintenance automated information systems for common data elements.

6. RELATED EFFORT. Marine Corps Expenditionary Shelter System (MCESS) ROC No. LOG 1.20, Electronic Maintenance Complex (EMC) ROC No. LOG 1.51, and Electronic Calibration Facility (ECF) ROC No. LOG 1.55.

7. TECHNICAL FEASIBILITY, COST FORECAST AND ENVIRONMENTAL IMPACTS

a. Technical Feasibility. MCATES is a low risk acquisition as system components will be commercial-off-the-shelf items. The development of MCATES will consist solely of packaging these items into a single functioning entity that is tailored to meet Marine Corps requirements. The Marine Corps has no testing requirements for electronic assemblies or subassemblies that are not currently being tested by industry via the concept of a central instrument controller and control of GPETE and testhead via the IEEE 488 bus.

b. Cost Forecast. It is anticipated that no development costs will be associated with MCATES. ATE systems will be selected from commercial, off-the-shelf equipment which support applications similar to MCATES requirements. Individual items of GPETE will be identified and procured as a normal part of the supporting weapons system acquisition process. Therefore, MCATES

can be specifically defined allowing the Marine Corps to proceed directly into acquisition and deployment with a minimum of risk and attainment of the FY 85 IOC. Total acquisition costs for MCATES Test Sets (controllers and testheads) are displayed in annexes A and B.

c. Energy/Environmental Impact. MCATES is comprised of modern electronic instruments, therefore, the power requirements will be very low, and sophisticated environmental control systems beyond those associated with the EMC shelters will not be required. Accordingly, the energy/environmental impact will be negligible.

8. MANPOWER REQUIREMENTS. The introduction of MCATES into the Marine Corps inventory can be accomplished within the existing manpower structure.

9. TRAINING REQUIREMENTS

a. Operator. Operator training for MCATES will consist primarily of incorporating the MCATES into the maintenance courses for equipment supported by the MCATES. UUT unique operator instructions will be embedded within the TPS for each UUT supported by MCATES. Formal operator training would consist of operator maintenance, system set-up/teardown, reconfiguration, system initialization, and Non-TPS unique operator actions.

b. Maintenance. Maintenance training will be incorporated into the TMDE Repair Course at MCLB, Albany, Georgia. It will consist of using the MCATES to identify faulty subassemblies in the instrument controller or testhead and to isolate faults to the lowest replaceable component of a faulty subassembly. Additional instruction identification and troubleshooting of IEEE 488 bus related faults will also be required. It is estimated that the total course impact would not exceed two weeks.

Major System: Marine Corps Automatic Test Equipment (MCATES) Date: 09-07-1984

LIFE CYCLE COST FORECAST

FUNDING PROFILE
(In Thousands of FY85 Constant Budget Dollars)

15 YEAR LIFE CYCLE

	PRIOR YEARS	CURRENT YEAR	BUDGET YEAR	FY86	FY87	FY88	FY89	FY90	TO COMPL'N	TOTAL PROGRAM
Major System										
RDT&E	0	0	0	0	0	0	0	0	0	0
PMC	0	0	4,458	6,638	6,640	2,213	0	0	681	20,630
QTYS FUNDED										
Instrument Controller	0	0	33	60	60	20	0	0	0	173
Test Head	0	0	33	60	60	20	0	0	0	173
TPS DMS	0	0	1	0	0	0	0	0	0	1
Support										
PMC	0	0	1,500	0	0	0	0	0	6,799	8,299
MILCON	0	0	0	0	0	0	0	0	0	0
O&MMC	0	0	182	439	595	570	552	0	3,016	5,354
MPMC	0	0	0	0	0	0	0	0	23,123	23,123
NAVY PROC	0	0	0	0	0	0	0	0	0	0
TOTAL PROGRAM	0	0	6,140	7,077	7,235	2,783	552	0	33,620	57,407

ANNEX A

Major System: Marine Corps Automatic Test Equipment (MCATES) Date: 09-07-1984

LIFE CYCLE COST ESTIMATE

(In Thousands of FY85 Constant Budget Dollars)

15 YEAR LIFE CYCLE

PHASE/CATEGORY		SUBCATEGORY	CATEGORY	PHASE
I. RDT&E PHASE				0
II. INVESTMENT PHASE				22,151
1. SYSTEM PRODUCTION/PROCUREMENT			20,651	
A. Major End Item (Contractor)		19,130		
B. Initial Provisioning/Spares, Repair Parts		1,500		
C. Government Furnished/Added Equipment		0		
D. Other Direct System Costs		21		
2. SUPPORT EQUIPMENT PROCUREMENT			1,500	
A. Ammunition		0		
B. Weapons and Tracked Combat Vehicles		0		
C. Guided Missiles		0		
D. Comm-Elec Equipment		1,500		
E. Support Vehicles		0		
F. Engineer and Other Equipment		0		
3. MILITARY CONSTRUCTION			0	
III. OPERATIONS AND SUPPORT PHASE				35,256
1. OPERATIONS			22,106	
A. Operator Personnel/Training		19,855		
B. Material Consumption		1,157		
C. Energy Consumption		1,094		
2. MAINTENANCE			3,736	
A. Organizational Maintenance		428		
1) Personnel/Training	86			
2) Maintenance Material	83			
3) Repair Material	0			
4) Other	260			
B. Intermediate Maintenance		928		
1) Personnel/Training	79			
2) Maintenance Material	78			
3) Repair Material	123			
4) Other	649			
C. Depot Repair		464		
D. Depot Overhaul		0		
E. Unprogrammed Losses		6,799		
F. Software Maintenance		116		

This is based on 200 annual man-hours for software updates with a 2000 man-hours per year base.

3. INDIRECT SUPT, BASE OPS & MAINT, OTHER O/H COSTS		3,289	
A. Base Operations	773		
B. Other Overhead Costs	2,516		
4. SUPPORT EQUIPMENT REQ		1,125	
TOTAL LIFE CYCLE COSTS			57,407

ANNEX B


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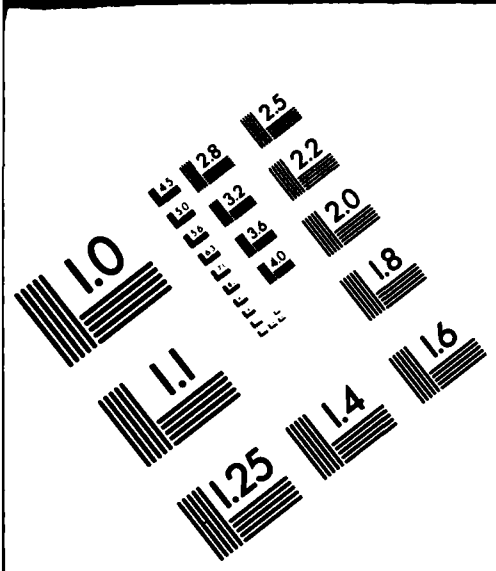

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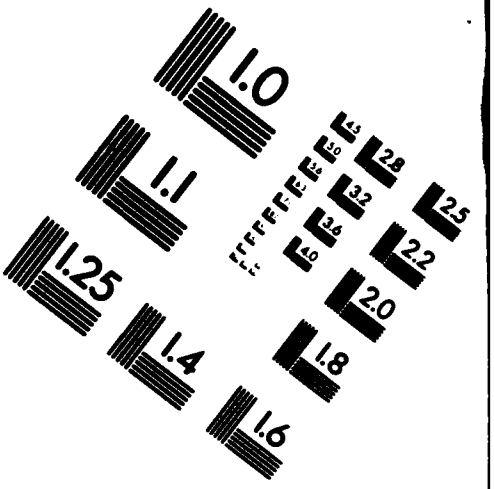

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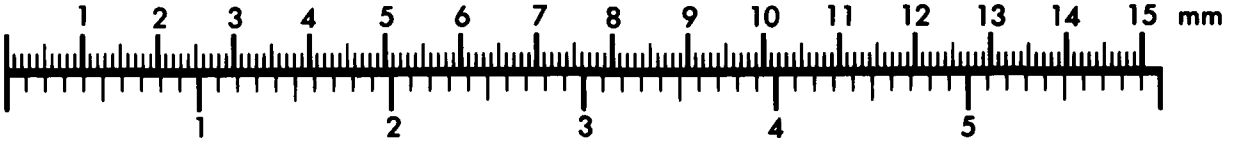

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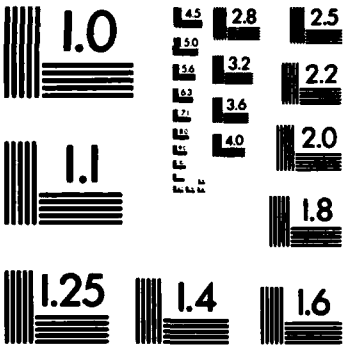

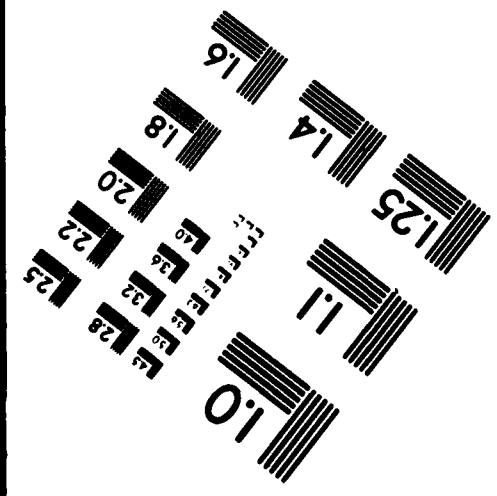

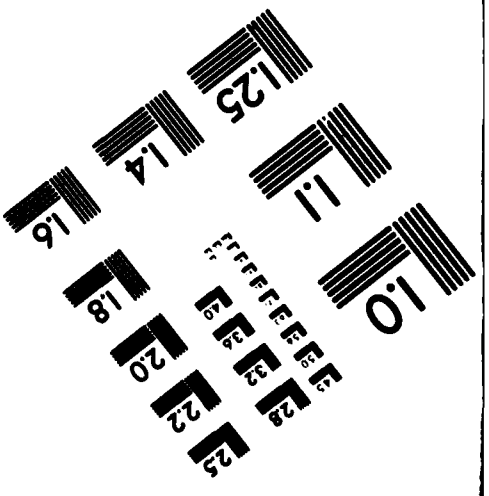

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SUPPLEMENTARY

INFORMATION

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

IN REPLY REFER TO
3900
C 441
NOV 17 1993

From: Commanding General, Marine Corps Combat Development Command, 2042 Broadway Street, Suite 3, Quantico, Virginia 22134-5021 (C 441)

Subj: REQUIRED OPERATIONAL CAPABILITY (ROC) FOR THE MARINE CORPS AUTOMATED TEST EQUIPMENT SYSTEM (MCATES) NO. LOG 1.73; CHANGE 1

Ref: (a) MCO 3900.4D

1. Purpose. To transmit a pen change to the basic ROC. Per the reference, the following change to the ROC for the Marine Corps Automated Test Equipment System (MCATES) NO. LOG 1.73 is approved.

2. Action. Replace paragraph 3b(3) with the following: "The inventory objective for MCATES (controllers and testheads) will be for approximately 50 units."

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

C. C. [illegible]LAK

Distribution:
See attached