



OPERATIONAL TEST  
AND EVALUATION

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25 OCT 1999

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS  
ATTENTION: SERVICE ACQUISITION EXECUTIVES  
ASSISTANT SECRETARY OF DEFENSE (COMMAND,  
CONTROL COMMUNICATIONS & INTELLIGENCE)  
DIRECTOR, DEFENSE INFORMATION SYSTEMS  
AGENCY  
DIRECTOR FOR FORCE STRUCTURE, RESOURCES &  
ASSESSMENT, JOINT STAFF (J-8)  
DIRECTOR, TEST, SYSTEMS ENGINEERING &  
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DEPUTY UNDER SECRETARY OF THE ARMY  
(OPERATIONS RESEARCH)  
DIRECTOR, NAVY TEST & EVALUATION &  
TECHNOLOGY REQUIREMENTS  
DIRECTOR, AIR FORCE TEST & EVALUATION

SUBJECT: Policy on Operational Test and Evaluation of Electromagnetic  
Environmental Effects and Spectrum Management

- References:
- (a) Department of Defense (DoD) Regulation 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs," 1996
  - (b) DoD Directive 3222.3, "Department of Defense Electromagnetic Compatibility Program (EMCP)," 1990<sup>1</sup>
  - (c) DoD Directive 4650.1, "Management and Use of the Radio Frequency Spectrum," 1987
  - (d) DoD Inspector General Audit Report 99-009, "Coordination of Electromagnetic Frequency Spectrum and International Telecommunications Agreements," 1998

### **Background**

Reference (a) states that all electric or electronic systems shall be designed to be mutually compatible with other electric or electronic equipment within their expected operational environment. Reference (b) describes the DoD electromagnetic compatibility program. Reference (c) specifies procedures for management and use of the radio frequency spectrum, including procedures for coordination with host nations where

<sup>1</sup> This directive is being updated as "DoD Joint Electromagnetic Environmental Effects (E3) Program and Joint Spectrum Center (JSC) Charter," (Draft).



deployment of equipment is planned. Reference (d) reports that DoD does not periodically evaluate the impact of international telecommunications agreements with allied nations on friendly electronic systems.

Electromagnetic Environmental Effects (E3) can adversely affect the operational effectiveness of military forces, equipment, systems, and platforms. Additionally, today's complex military operational environment is characterized by an increasingly congested electromagnetic spectrum coupled with a reduction of spectrum allocated for exclusive military use. The mix of DoD-developed, non-developmental, and commercial-off-the-shelf electronic equipment increases the importance of effectively managing E3 and spectrum usage in the battlespace. It is the responsibility of the Program Managers (PMs) to ensure, and the responsibility of the Operational Test Agencies (OTAs) to validate, the readiness of systems to be fielded into this environment.

Traditionally, operational evaluations of E3 have been limited to narrowly-scoped operational scenarios and limited electromagnetic environments. Specifically, evaluations have been limited to:

- Intra-platform/system environments rather than inter-platform/system environments.
- Single Service participation in testing rather than multi-Service.
- Single mission areas rather than multiple mission areas.

A number of joint-Service operations have identified instances of E3 problems between operational forces. These instances have resulted in a restricted operational employment, diminished mission effectiveness, and fratricide. Furthermore, peacetime deployments to host nations are failing to consider the private and commercial use of spectrum in those nations.<sup>2</sup> Early operational assessments need to focus on these issues from the onset of the development cycle. The Department must reduce the impact of potential interference, avoid the cost of making mitigating modifications in the field, and ensure that the warfighter is cognizant of his systems' vulnerabilities and limitations in these areas.

### **Scope**

E3 encompasses a broad range of electromagnetic disciplines.<sup>3</sup> This policy encompasses all aspects of E3, but emphasizes electromagnetic compatibility/electromagnetic interference and the hazards of electromagnetic radiation to ordnance. This policy also focuses on limitations to operational performance caused by restrictions on spectrum availability.

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<sup>2</sup> Allocations for use of the spectrum vary in different regions of the world. These allocations are set by international agreements, and nations control the use of the spectrum within their borders.

<sup>3</sup> Electromagnetic compatibility/electromagnetic interference (EMC/EMI); electromagnetic vulnerability (EMV); electromagnetic pulse (EMP); electronic protection (EP); hazards of electromagnetic radiation to personnel (HERP), ordnance (HERO), and volatile materials; and natural phenomena effects of lightning and p-static (Joint Pub 1-02, "Department of Defense Military and Associated Technical Terms," 23 March 1994 (as amended through 10 February 1999).

## **Policy**

This policy is intended to more clearly define the role of Operational Test and Evaluation in identifying potentially adverse E3 and spectrum availability situations. The policy is intended to make PMs and OTAs aware that the Director, Operational Test and Evaluation (DOT&E) plans to assess this area more systematically, as described below. It is not intended to replace or add to any existing DoD directives or regulations, but to ensure that current required practices are applied and leveraged to the fullest extent in the evaluations of system operational effectiveness.

DOT&E will:

- Review Service Test and Evaluation Master Plans (TEMPs), System Threat Assessment Reports, Operational Requirements Documents, test plans, test concept briefings, and test reports to determine the adequacy of E3 testing.
- Ensure that E3 issues are satisfactorily reviewed by program acquisition Integrated Product Teams (IPTs).
- Review Services' evaluation approaches, including modeling and simulation, small-scale tests, and appropriate chamber and laboratory tests.
- Leverage the evaluation of E3 impacts during large-scale field training exercises.
- Review Services' early assessments to identify and understand those situations where E3 and spectrum limitations would likely affect mission accomplishment. The results and projected impacts should be reviewed in the appropriate IPT forum and be used in the design and scoping of full-scale operational tests.
- Review the DD Form 1494<sup>4</sup> and JF-12<sup>5</sup> process and share the data with the OTAs.
- Review E3 engineering assessments and qualification test plans and reports.
- Report the status of E3 issues for each program in the DOT&E Annual Report, and report specific program findings as part of Beyond Low-Rate Initial Production reports to the Secretary of Defense and the Congress.
- As E3 issues related to fielded systems arise during Operational Tests (OTs) or during large-scale training exercises used to complement OTs, report these issues to the appropriate agencies for resolution.

OTAs are advised to:

- Work in conjunction with the Joint Spectrum Center, the Defense Intelligence Agency, the system user, and others as appropriate to conduct early independent analyses of potential E3 issues, and review the PM's resolution of these issues.
- Conduct early operational assessments that consider the intended operational environment, including storage, training, transportation, staging, and conduct of the battle in single Service, joint, and international deployments. (Avoid relying solely on developer-planned E3 analyses or evaluations.)

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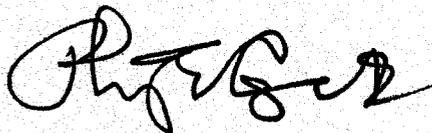
<sup>4</sup> Application for Equipment Frequency Allocation.

<sup>5</sup> The process by which spectrum allocations and frequency assignments for systems are approved.

- Include E3 and spectrum availability assessment issues as a standard presentation at Operational Test Readiness Reviews. These assessments should include the operational impact of any waivers and results of analyses normally accomplished as part of the DD-1494 or JF-12 review process.

PMs should ensure that E3 test and evaluation receives adequate funding and is sufficiently addressed in system TEMPs. This area will receive close DOT&E scrutiny as part of the TEMP approval process.

This guidance is effective immediately and applies to all DOT&E oversight programs. It is applicable to programs at Milestone 0 at the time of approval. Programs between Milestone 0 and Milestone III will incorporate this approach during their next TEMP approval cycle.



Philip E. Coyle  
Director

cc:  
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